INTERNATIONAL CONFERENCE ON EDUCATION IN MATHEMATICS, SCIENCE & TECHNOLOGY

ICEMST2016

May 19-22, 2016
Bodrum / TURKEY

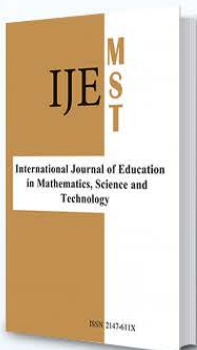## ABSTRACT BOOK

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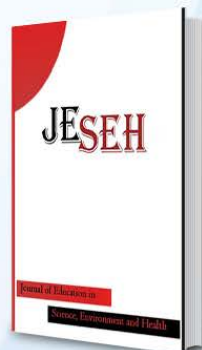## ABSTRACT BOOK

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4TH-YEAR-PRIMARY SCHOOL CHILDREN: DEVELOPING DIFFERENT MODELS

Neslihan Şahin, Ali Eraslan

In these days, children are confronted with a World, in which there is complex, dynamic and powerful information systems around them in the line with knowledge-based environment (English, 2003). In order to interpret complex systems and use them, individuals must have the ability to analyze, coordinate and organize together with mathematical skills such as creating concepts, using different representations, delivering results, guessing, describing, validating and working with groups (English, 2009; English, 2003). To be able to cope with such complex systems, it is important for mathematics education that children have experience with situations in which they gradually engage the real problem with complex systems and interdisciplinary complex systems at starting from the primary school (English & Watters, 2004). In doing this, mathematical modeling consisting of cycles of model eliciting and relating model with real-life is one of the available approaches (Lesh & Zawojewski, 2007; Romberg, Carpenter, & Kwako, 2005). Therefore, the purpose of this study is to examine the models of 4th-year-primary school children, who have modeling experience with the help of model eliciting activities. This research was conducted during the 2015-2016 academic year, in a primary state school in a large city along the Black Sea Region of Turkey with students of families from lower socioeconomic backgrounds. Participants were a total of 24 children in one of the 4th grades. The children in groups of four were assigned a modeling activity to work on for two class-hours every week for five weeks as a group. Modeling processes of each group and presentations at the end were video and audio-taped. In the present study, the mathematical thoughts, developed models, written responses of the 4th-year primary-school children in the activity on the methods of solving the Car problem (English, 2004) were qualitatively analyzed in the light of the modeling cycle developed by Blum and Ferri (2009). The results showed that children were able to interpret qualitative data with the quantitative data, take account of different parameters together and make frequency tables in the modeling process. At the end, they presented and explained their models if they were appropriate.

Keywords: Primary school children, Modeling, Mathematical modeling, Model eliciting activities

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6TH GRADES STUDENTS' ALGEBRAIC THINKING SKILLS

Alattin Ural

The purpose of this research is to explore sixth grades students' algebraic thinking levels. As known, The students' process of transition from arithmetic to algebra start in sixth grade. To know the students' level of algeabric thinking and algebraic thoughts they are able to handle in this level will be useful in terms of planning the process of algebra teaching. With this aim, 31 sixth grade students of a middle school which was selected randomly in Burdur were included in the research. In order to gather data, an algebraic thinking levels test (CDSBT-twenty seven items and four levels) were used. This test developed by Hart et. al. (1998). The current research is a qualitative research and the model applied in the study is descriptive method. The current research reveals that 48% of the participants were at the level-1, 26% of them were at the level-2, 23% of them were at the level-3 and also only one student was at the level-4. Also, it was determined that "calculation the values of an algebraic expression", "adding algebraic expressions", "Multiplying a whole number and an algebraic expression" were the main difficulties that do not lead the students to pass the next level.

Keywords: Algebraic thinking, sixth grade students

7TH GRADE STUDENTS' VIEWS REGARDING ENRICHED EDUCATIONAL PRACTISES WITHIN THE SCIENCE COURSES

Şahin Idin, Cemil Aydoğdu

The aim of this study is to define students' views regarding science courses which was carried out with enriched educational practises. This study was carried out in the autumn of 2014-2015 education-teaching year. Qualitative research method was adopted. In this concept, it was benefited from case study strategy. Interview, observing and documant analyse techniqs were used as data measurument tools. Semi structured interview forms and students diaries were used to define student's views about learning process. According to interviews and diaries which were obtained from students that students think science courses has been starting, more amusing, more effective, more interesting and more nice after using enrichment educational practises in science courses. They also told that they learnt issues by understanging. Students pointed out enrichement educational practises can be used in other science issues. Datas of this study are taken into consideration, it can be recommended that these applications can be used for, irrelevant students to science, who do not do their homework and do not like science courses.

Keywords: Sciences, Qualitative research, Enrichement educational practises

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9TH GRADES BIOLOGY COURSE IDENTIFYING THE FORMATION LEVELS OF THE ACQUISITION OF SCIENCE- TECHNOLOGY- SOCIETY- ENVIRONMENT (STSE) AMONG STUDENTS

Tahir Atici, Semra Öz

The aim of this study; Determining the acquisition levels of the subjects among students in which the biology course book include that has been in use since 2008-2009 years of study, has been aimed. It has been stated in this study that the acquisition levels of science-technology-society-environment (STSE) among the students in Secondary education 9th grade biology course. It has been formed a questionnaire which has 23 confidential questions. A success test has been applied to a total 100 students in Ankara; Ankara Anatolian High School, Yıldırım Beyazıt High School and Dikmen Hurriyet Anatolian High School. The pre-application of this success test has been applied in the first term's 3rd week, and the final application has been applied 3 weeks before the end of the 2nd term. The acquired data as a result of the study has been evaluated by using the STSE cover program. The analyses of the findings: the acquisition level of science-technology-society-environment (STSE) among the students in Secondary education 9th grade biology course has been determined as 9,17%. Besides, the achievement percentages of the subtitles related to the subject ; the cognitive acquisition level in the 9th grade biology course syllabus among the students is 8,31%, the sensual acquisition level in the 9th grade biology course syllabus among the students is 10,57%. It has been determined that the acquisition of the sensual level is 2,26% more than the cognitive level.

Keywords: Schedule development, Target behaviours, Cognitive and Sensual Acquisitions

A BIOMECHATRONIC APPLICATION ON PROSTHETICS FOR UNDERGRADUATE ENGINEERING STUDENTS

Faruk Ortes, Hasan Kemal Surmen, Yunus Ziya Arslan

Human hand prosthetics imply a great challenge to researchers to help regaining the lost motor functions for amputated people. A relatively high amount of labor and budget are required to reach the ordinary prosthetics for amputees. Improvement of assistive technologies has provided to design and manufacture more functional hand prosthetics. Novel tools employed in assistive technology including 3-dimensional printers and user-friendly electronics complementary devices have made a great contribution to prosthetics area with fast and cost effective solutions. Although a significant development of technical facilities has been occurred, prosthetic hands with high functionality could not gain wide currency since the manufacturing and design processes require more educated engineers and biomechanicsts. Introducing the design and manufacturing steps of prosthetics for educational purposes in engineering and life sciences could be very effective in order to ease accessing the more functional prosthetics and to increase the prevalence of use. Education of new methodology and devices provides crucial opportunities to enhance the ability and usage of new generation prosthetics. In this study, a prosthetic hand design, control and manufacturing implementations were carried out by undergraduate students in the context of dissertation study. The custom based human hand prosthetics was manufactured according to following steps. Three-dimensional CAD models of prosthetic hand components including palm and fingers were designed in a solid body modeling software. Then, the model parts were printed using 3-D printers and they were assembled. The forces were transmitted to the fingers via elastic strings which were controlled via Arduino controlled servo motor. The programmable motions of servo motors enable to direct control of fingers. Specific education on design, manufacturing and control of human prosthetics has the potential to provide a high impact on obtaining more functional and cost effective prosthetics which enables more people to regain their lost motor patterns.

Keywords: Assistive technologies, Human hand prosthetics, Science and engineering education

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A CASE STUDY ABOUT DIDACTICAL PREFERENCES OF TWO FACULTY MEMBERS WHO LECTURE THE SAME SUBJECT IN TWO DIFFERENT PROGRAMS

Betül Karaduman, Ahmet Doğanay, Sedat Uçar

The aim of education is to guide people to develop their own knowledge in the contemporary societies. Therefore, teachers' role as guidance is associated with their own knowledge and perceptions. In this context examination of the process of didactical transpositions of instructors' own concepts become very important. "Didactical transposition theory" deals with changes about these concepts. Didactical transposition engaged with process of the definition of knowledge to be learned in a certain period. Therefore, it is as a historical, epistemological and sociological study of scientific knowledge and examine the activities that shape the transposition of the scientific knowledge to the learned knowledge (Yıldırım, 2008). Knowledge is regulated by cultures and disappears. Therefore, the same knowledge may exist in each different culture, but meanings that knowledge has, can contains different properties. In this sense, person who transpose scientific knowledge become very important. First stage of transposition of scientific knowledge to learned knowledge is external didactical transposition and in this process most important role belongs to teachers. Because, teachers plays an active role in a process of transposition of knowledge. The most important determinant of this process is didactical preferences of lecturers. Thus, the aim of the study is to determine the didactical preferences of faculty members who lecture General Chemistry-I. We tried to determine didactical preferences of two faculty members who lecture General Chemistry-I at the same program and one faculty member who lecture General Chemistry-I at two different programs, about

"structure of atoms". Study is conducted as a case study. The semi-structured interviews were conducted with faculty members before instruction. Content analysis was used for data analysis. Didactical preferences of faculty members and suggestions about it will be presented.

Keywords: Didactical transposition, Didactical preferences, General chemistry

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A CENTRIPETAL DISCIPLINE AND A CENTRIPETAL FORCE FOR MEANINGFUL EDUCATION AND WORLD PEACE– STEM, EDUCATORS, HUMANISTS, AND SOCIAL SCIENTISTS IN THE CLASSROOM

Osayimwense Osa

Early in my high school days, I had a knowledgeable science teacher, in fact, my first General Science teacher who made it interesting for me and for the whole class, and I remember him fondly. I credit my early interest in science to this educator. Because Biology, Chemistry and Physics were not separated in my advanced elementary school, what we had was called General Science in the early 1960s. What I learned early in this class, and etched in my memory is "Science is a systematic body of knowledge based on observations and experiments." Since the 1960s, I have been applying observation, experiment, where and when necessary, and critical thinking to my studies in literature and other areas of the humanities. Passion and intense observations, and real experiments where and when necessary facilitates understanding and knowledge of the humanities and social sciences. Clearly, the intersection of science and the humanities is indispensable in thorough and effective education if it is meaningfully addressed. Today, STEM – Science, technology, engineering and mathematics is significantly a buzzword in education but one should not ignore or neglect the mind or the human being behind this STEM. The what, why and how of STEM should be meaningfully integrated broadly in the whole school curriculum for effective result. STEM should not be delayed until middle school or high school. Children have a keen, natural wonder about concepts and processes surrounding them. For children ages four and under, structured early education in science, technology, engineering and mathematics sparks the kind of intellectual creativity, critical thinking, and development of habits of mind that lays the groundwork for their entire academic well-being…A child's individual social, emotional, intellectual, and physical development will reach its fullest potential if STEM concepts are introduced and explored from the very earliest point (Ricciardi, 2014), and undergirded by studies in the humanities and social sciences. It is gratifying to note that Heritage Museums and Gardens School in Sandwich in Massachusetts was created to cultivate young minds and its core group of STEM-influenced and well-versed educators will use STEM as a springboard to multidisciplinary learning. Deborah Fitzgerald (2014), professor of the history of technology at Massachusetts Institute of Technology and dean of the MIT School of Humanities, Arts and Social Sciences, argues that the humanities are just as important as STEM, even at MIT — a bastion of STEM education. According to her, "Some may be surprised, and, I hope, reassured, to learn that … we [at MIT] view the humanities, arts and social sciences as essential, both for educating great engineers and scientists, and for sustaining our capacity for innovation," (2014). The United States has developed as a global leader, in large part, through the genius and hard work of its scientists, engineers, and innovators. In a world that's becoming increasingly complex, where success is driven not only by what you know, but by what you can do with what you know, it's more important than ever for our youth to be equipped with the knowledge and skills to solve tough problems, gather and evaluate evidence, and make sense of information. These are the types of skills that students learn by studying science, technology, engineering, and math—subjects collectively known as STEM (http://www.ed.gov/stem) The US government posits that all young people should be prepared to think deeply and to think well so that they have the chance to become the innovators, educators, researchers, and leaders who can solve the most pressing challenges facing our nation and our world, both today and tomorrow. But, right now, not enough of our youth have access to quality STEM learning opportunities and too few students see these disciplines as springboards for their career. The Obama administration is keen on producing a substantive number of STEM teachers for the schools and wants all children to be able to compete in contemporary high tech global economy. The rationale or the why of STEM and the emphasis on it are laudable. The positive result of STEM education cannot be doubted. Its future is bright. While this

piece of news may not be directly related to STEM, it has a technology connection and global interest that need careful reflection: The United Kingdom (UK) has become the first country to approve laws to allow the creation of babies from three people, and the first baby could be born this year, 2016. (www.bbc.com/news/health-31594856). Emphasis on STEM however should not spell the neglect of developing the human mind through studies in the humanities and the social sciences. There is no need to produce scientists, technogists, engineers, mathematicians (STEM) who think mechanically or simplistically. Whether historically true or not, Albert Einstein's statement, "I fear the day that technology surpass our human interaction. The world will have a generation of idiots" should be carefully integrated in all STEM education. There is no need for smart scientists, technogists, engineers, mathematicians (STEM) to blast or bomb out world achievements enshrined in ancient and modern monuments that speak to all ages particularly, those recognized by United Nations Educational Scientific and Cultural Organization (UNESCO) as world heritages. To do that is to obliterate a significant part of human evolution in art and cultural advancement, and in scientific and technological advancement as evidenced in the technology that went into the building of the pyramids that are still standing today. No matter if the civilization was Mesopotamian, Egyptian, or Mayan, its legacy is in part marked by towering pyramids (www.smithsonianmag.com/hstory/ancient-pyramids-around-the-world-10343335/). That kind of "ancient" technology can stimulate curiosity and passion and engender heightened student satisfaction and whet their appetite to know about the what, how, and why of the technology behind these ancient structures. Isn't this in part, an invitation to reflect on the history of the past and present of technology? Usually students want to learn more when they see something in a real-world context. Every education teaches a philosophy; if not by dogma then by suggestion, by implication, by atmosphere. Every part of that education has a connection with every other part. If it does not all combine to convey some general view of life, it is not education at all" (G.K. Chesterton, The Common Man). This session will deal with STEM as a centripetal discipline and a centripetal force that draws together scientists, educators, humanists, and social scientists for purposeful teaching and learning of science, technology, engineering, and mathematics for more technological advancement that ultimately contributes to international and multicultural communication and understanding, and genuine peace in a high tech global world or global economy.

Keywords: Educational technology

A COMPARATIVE ANALYSIS FOR MINIMUM LEARNING JUDGEMENT SYSTEM OF ONLINE LEARNER

Jaechoon Jo, Heuiseok Lim

The popularity of Online Education is rising along with the development of ICT (Information Communication and Technology). Also, many online learners are joining online education services such as Coursera, edX, Udacity, and Khan Academy. For online education services, instructors want to know whether or not online learners absorbed learning material without requesting that users take a test. In this paper, we proposed a minimum learning judgment model and developed a system to judge what online students learned while watching video lectures by using a word game. To verify this system, we conducted online teaching for two weeks at a liberal arts class at K university in South Korea. A total of 35 students participated in the experiment. After two weeks, we conducted a satisfaction survey and analyzed log data from the minimum learning judgment system. The results of the survey show that the satisfaction score for the system is 80.6%. Analysis for log data shows that the accuracy of concentration certainty judgment is 60% and the accuracy of mind-wandering judgment is 100%. For future studies, we will revamp the minimum learning judgment model to increase the accuracy of minimum learning judgment for concentration and we will conduct the experiment with more participants to collect more log data from the system.

Keywords: Online learning, Mind wandering, Word effect, Learning Judgement

A COMPARISON AMONG STUDENT TEACHERS' PERCEPTION ON MATHEMATICS LITERACY SELF-EFFICACY: NORTH CYPRUS EXAMPLE

Sarem Özdemir, Vasfiye Karabiyik

This study aims to explore the perception of student teachers' mathematical literacy self-efficacy studying in the faculty of education in Cyprus International University. Survey method was used to collect data. Questionnaire used in the study was developed by Özgen and Bindak (2008). Pilot application helped researchers to confirm both reliability and validity indexes if the original scale is eligible to apply to the student teachers. Mathematical Literacy Self-Efficacy Scale was used to assign student teachers, studying in computer education and instructional technology, psychological counselling and guidance, preschool education, primary school education and mentally handicapped teaching. 200 student teachers attended the study. Both descriptive and inferential statistics were used to analyse the data. Since logical and mathematical reasoning ability is linked to mathematical literacy, results of the study are supposed to describe the present situation and contribute on helping educators, teachers and student teachers to revise and criticise the current curricula of teacher education.

Keywords: Mathematics literacy self-efficacy, Student teachers

A COMPARISON OF ARITHMETIC AND ALGEBRAIC PROBLEM SOLVING STRATEGIES USING LOGISTIC REGRESSION

Ramazan Gürbüz, Ali Temurtaş

The purpose of this study is to examine how well using arithmetic or algebraic strategies predicts students' verbal and symbolic problem solving performances. Moreover, if there is a grade level effect on problem solving achievement will also be investigated. The study was conducted with 248 students (69 5th graders, 60 6th graders, 68 7th graders and 51 8th graders). Students were asked to solve one arithmetic-verbal and one algebraic-symbolic problem. Students' solution strategies for each problem were grouped as algebraic, arithmetic and other (no solution or explanation). Student responses were graded as 0 for no response/wrong and 1 for correct. A logistic regression was performed for each problem to ascertain the effects of grade level and strategy on the likelihood of successfully solving problems. The logistic regression models were statistically significant.

Keywords: Arithmetic thinking, Algebraic thinking, Problem solving, Middle school students

A COMPARISON OF THE COGNITIVE DEMANDS OF TASKS: 7TH GRADE MATHEMATICS TEXTBOOK VERSUS THE NATIONAL CURRICULUM

Özlem Engin, Renan Sezer

The aim of this study is to compare the cognitive demand levels of tasks proposed for 7th grade in The Middle School Mathematics Curriculum for 6th-8th Grades in Turkey (MSMC) and the tasks encountered in a 7th grade mathematics textbook representing Turkey. Qualitative methods were used to collect and analyze the data. The tasks were coded according to the four cognitive demand levels stated in the QUASAR Task Analysis Guide, namely: memorization, procedures without connections, procedures with connections and doing mathematics. The percentage of tasks requiring these cognitive demand levels in the curriculum were compared with those from the textbook. The results of the research indicate that the cognitive demand levels of tasks in both the MSMC and the 7th grade textbook are high. Another finding is that the cognitive demand level of tasks in the textbook is higher than those proposed in the MSMC; however, both in the MSMC and the textbook, the majority of the tasks requiring a high cognitive demand level were in the category of 'procedures with connections'. These findings indicate that even though the national curriculum has a powerful effect on textbooks, it can also be limiting. Moreover, in the textbook, geometry had the least percentage of tasks requiring a high cognitive demand level and in the area of statistics & probability, no task was found requiring the cognitive level of 'doing mathematics'. Based on these results, it is recommended that the percentage of tasks requiring the cognitive demand level of 'doing mathematics' should be increased. In addition, it is desirable that professionals involved in writing/using textbooks should familiarize themselves with the cognitive demand levels. Further research can involve doing similar analysis for textbooks in different grade levels and/or investigating the 7th grade mathematics textbook from other perspectives.

Keywords: Mathematical tasks, Cognitive demand levels, 7th grade mathematics textbooks, 6th-8th grades mathematics curriculum of Turkey, QUASAR

A DETERMINATION OF TEACHERS' PEDAGOGICAL CONTENT KNOWLEDGE TO RATIO AND PROPORTION

Zeynep Sonay Ay, Ceylan Şen

Pedagogical content knowledge defined as teachers be able to teach and transmit their knowledge on subject to students (Rodgers & Raider-Roth, 2006). Shulman (1986) indicate that teachers' pedagogical content knowledge affect their teaching process. The teaching process can be exemplified as time and classroom management, preparing teaching content and planning, material development, using teaching strategies, using effective measurement and evaluation (Hudson, 2007). Lanius ve Williams (2003) emphasize the importance of teaching ratio and proportion that understanding of many subjects and concepts in mathematics and other disciplines. Ratio and proportion are connected with many subjects as numbers and operations, fractions, statistics and probability, algebra, angle and length, measuring. Teachers' pedagogical content knowledge is become important for providing meaningful learning on ratio and proportion by students. So, this study was carried out to determine the teachers' pedagogical content knowledge to ratio and proportion. A semi-structured interview form developed by the researchers will be used as data collection tool. The data obtained from the interviews will be analyze and will be report by using descriptive analysis method. The study results will be presented in the direction of the data obtained.

Keywords: Pedagogical content knowledge, Ratio and proportion, Elementary mathematics teacher

A GAME DESIGN INTENDED TO TEACH TURKISH TO FOREIGNERS: KARNIYARIK

Ahmet Akçay, Adem Özkan

One of the usage area of the computers which are one of the most important tools of today's technology is games. The computer games which have been started to be prepared with the development of the computers are prepared to serve various purposes. According to Bayırtepe and Tüzün (2007), computer games have the feature through which the children can have a good time and besides, they can also learn new things or reinforce what they have learnt through the activity. It is thought that the computer games to be prepared with these features can be an effective tool in teaching Turkish to foreigners. Considering this fact, the presentation of the game named Karnıyarık which has been designed to be used in teaching Turkish to foreigners will be done. The game Karnıyarık has been prepared to teach the imperative mood in Turjish and to be applied on examples. In the game which has been prepared based upon the study conducted by Kara, (2011), the students are expected to put the sentences which are given randomly in order. The sentences in the game have been prepared from the recipe of "karnıyarık" which is one of the meals in traditional Turkish cuisine. In the game "Karnıyarık", while the grammar subject the imperative mood is taught to the learners, the learners are provided to learn Turkish cuisine, shopping list, recipe and general information of cooking a meal in traditional Turkish cuisine. At the end of the study, recommendations about the games to be prepared to teach Turkish to foreigners are presented to those who work in this field.

Keywords: Computer, Computer games, teaching Turkish to foreigners

A GENERAL VIEW OF COMPUTER FORENSICS EDUCATION IN TURKEY: EXIGENCE OF COMPUTER FORENSICS AND ITS EDUCATION

Merve Orakci

Nowadays, information technologies as a part of the social life cause to many negative situations, along with their benefits on people lives. They have spread in the whole branches of the society fast and now they become essential for it. Moreover, security gaps in information systems are abused by some people and people have started perpetration via information systems. Crimes that are committed via information technologies are called as cyber crimes. As time passes by, cyber crimes' danger and number increase as a new crime type and also more complicated structure of cyber crimes becloudes their detection. This difficulty reveals needs of computer forensics expert who capable to struggle with these types of crimes. Computer forensics is an interdisiplinary science and to be capable in this branche possible with having knowledge of law, information systems and criminology. Therefore, education of computer forensics becomes a necessity to train qualified individuals in this branche that needs existence of experts. In this study, the processes of computer forensics are analysed by explaining "computer forensics" term, at first. Thereafter, current situation is evaluated by discussing exigence and importance of the computer forensics education in Turkey.

Keywords: Computer forensic, Computer forensics education, Cyber crime

A LABORATORY ACTIVITY BASED ON PREDICTION-OBSERVATION-EXPLANATION (POE) METHOD: SALT

Gonca Harman, Aytekin Çökelez, Hilmiye Betül Süer

Salt is extremely important substance for life and it has fairly wide range of applications in different disciplines. In this study, misconceptions held by science teacher candidates about the formula of the salt, strength of acid and bases that is formed salt, type of the salt as acidic / basic / neutral have been investigated bu using the prediction-observation-explanation method. In this study a post-test design without a control group has been used. The study group consisted of a total of 43 third-year science teacher candidates attending the Department of Science Teaching of a Faculty of Education. Science teacher candidates realised experimental activity that was prepared according to prediction-observation-explanation method in the laboratory. Experimental activity contains preparing solutions of the potassium iodide, sodium chloride, ammonium nitrate, ammonium sulphate, sodium acetate and sodium carbonate, immersing the pH indicator card in the solutions, recording the colour change that will occur in the pH paper and the pH value for the corresponding colour on the scale. Teacher candidates have been asked to make prediction about types of the salt before the experimental activity. Teacher candidates have been asked to write their observations after the experimental activity. Teacher candidates have been asked to compare predictions and observations in the explanation section and asked to answer discussion questions. Predictions and observations made by teacher candidates and discussion questions answered by them have been discussed in the laboratory. Results of the study showed that more than half of the science teacher candidates could write the formula of the salt, strength of acid and bases that is formed salt and type of the salt as acidic / basic / neutral. According to the results, their predictions are compatible with observations. It was determined that few science teacher candidates have misconceptions. Some of the science teacher candidates expressed that memorizing knowledge were proved to be really true by the experimental activity conducted in accordance with the POE method. They expressed that misconceptions were noticed by working actively in the learning process in the interview. Important part of science teacher candidates expressed that POE create positive effects on the visual memory and provides permanent learning. Some of the science teacher candidates expressed that activities carried out by TGA is intertwined with a variety of scientific process skills including prediction, observation, experimentation, data recording, classification, drawing conclusion.

Keywords: Science education, Prediction-observation-explanation method, Misconception, Salt, Science teacher candidates

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A LEARNING STYLE INFERENCE SYSTEM BASED ON FUZZY LOGIC TECHNIQUE

Muhammet Uysal, Kadriye Filiz Balbal, Naciye Mülayim, Ali Özdemir, Ayşegül Alaybeyoğlu

In this study, a fuzzy logic based Dunn learning model is developed to determine learning style of the students. Dunn learning style has five important factors namely, environmental, emotional, sociological, physiological and psychological. In this study, a fuzzy logic system which includes these input parameters and an output namely learning style is proposed. Answers of the students are rated and given as an input to the proposed fuzzy logic engine. The developed software system inferences Education Style, Learning Status and the Level of Learning Style of the students. By this way, the instructor will be able to match his teaching style with student's learning style which contributes to student's success in education field.

Keywords: Education, Dunn, Fuzzy logic

A MOBILE APPLICATION DESIGN FOR SPECIAL EDUCATION TO TEACH RELATIONS BETWEEN OBJECTS

Hüseyin Göksu, Tolgay Karanfiller, Kamil Yurtkan, Gökhan Güven

Students who needs special education have difficulties to improve cognitive abilities and acquire new knowledge. They could also need to improve their behavior, communication and relationships with their environment. In this paper, we propose a mobile application that is mainly focused on the education of mentally handicapped students. It is aimed to teach them basic skills in order to improve their basic abilities such as to recognize and classify the objects in a scene according to their size. The main objective of the proposed application is to keep the students' attention continuous. The major advantage of the mobile application is that students will be able to study every time and in everywhere, so students learn whenever they want without any limitations. The novelty of this study is that it targets improving the ability of the students to put the objects into order. Student will face with four images with different objects, in various numbers, types, colors and sizes. Then, the application will ask to student to put them into ascending order according to their size. This section will be repeated four times with different images on the same concept. According to the student's response, if the student scores at least three correct answers out of four, the section will be completed and application will shift to the next section. This process will take place until all the stages for the selected section is done. The mobile application will be created on Android Studio, based on java programing language and it is planned to run on diveces which use android operating system. Devices with the installed version of at least Android 4.0 (Ice Cream Sandwich) operating system will be compatible.

Keywords: Teaching module, Mobile application, Computer assisted education, Object relations

A STUDY ON UNIVERSITY STUDENTS' VIEWS CONCERNING ONLINE EXAMS

Ahmet Oğuz Aktürk, Barış Emlek

This study aimed to analyze the attitudes of university students who had previous online exam experience towards online exam on the basis of the gender variable as well as analyzing some variables (gender, level of computer use, and the year of internet use) which predicted their online exam anxiety. 162 students attending an established university in Central Turkey were included, on a voluntary basis, in this study, in which the relational survey model was used as the research method. Research data were collected via the "Scale for Attitude towards Online Exam", which was administered to the students. As a result of the analysis of the data obtained from the scale, it was found that the students' attitudes towards online exam were positive and at the same time the female students' attitudes towards online exam were more positive compared with the male students'. In addition, as the students' level of computer use and the duration of their internet use increased, their attitude towards online exam also increased positively. On the other hand, as a result of the multiple regression analysis in which factors that predicted students' anxiety about online exam, level of computer use was identified as the strongest predictor of anxiety about online exam.

Keywords: University students, Attitude towards online exam, Gender, Anxiety.

A SYSTEMIC FRAMEWORK FOR ASSESSMENT OF BLENDED ACHIEVEMENT IN TRANSNATIONAL SCHOOLS AS COLLABORATIVE LEARNING COMMUNITIES

Zayed Hamdan

Education in public and private schools and higher education institutions by the end of the twentieth century is experiencing accelerating methodical changes from massive residential to blended, online and wireless teaching and learning. Assessment on another hand, while looked upon as the backbone of educational system and the steering operational mechanism of classroom educational programs is either neglectfully applied or sporadically practiced as in the cases of diagnostic needs and formative assessments. Electronic schooling is losing its merits in regard of face-to-face communication, instruction, counseling, guidance and follow-up of students' learning achievements. Hence an urgent need is aroused to introduce a compatible approach in the process of schooling to fill the assessment gap which currently is suffering and to mentoring students' blended learning towards its achievement ends. The systemic assessment methodology presented in this article for measuring blended achievement in transnational schools as collaborative learning communities is aimed to serve above ultimate reforming purposes.

Keywords: Blended achievement, Online and wireless teaching

ACADEMIC POTENTIAL BELIEFS AND FEELINGS OF PRESERVICE TEACHERS IN TERMS OF SEVERAL FACTORS

Ümit Duruk, Abuzer Akgün, Ceylan Doğan

Students possessing positive beliefs and feelings about their both compulsory and selective courses are able to perform better and consequently they increase their academic achievement by this way. The importance of specific abilities of students are often surpassed by the relative importance of beliefs and feelings about academic achievement. The more students have beliefs to be successful, the more they get the chance to transform their potential about developing abilities into practice. This study aims at exploring preservice teachers' academic potential beliefs and feelings. The study was carried out using survey method. The sample of the study was consisted of preservice teachers studying in different departments of Education Faculty. Data were collected through the Turkish version of Academic Potential Beliefs and Feelings Questionnaire (APBFQ) developed by Patall, Awad & Cestone (2014) and adapted into Turkish by Akın, Akın & Yıldız (2014). Data obtained were descriptively presented in frequencies, percentages and mean scores. In the analysis of the possible significant difference in mean scores with regard to demographic variables, t test and ANOVA were used and findings were given in tables.

Keywords: Academic potential, Beliefs, Feelings, Preservice teachers

ADAPTATION OF MATH OUTCOME EXPECTATION SCALE TO TURKISH

Şule Akyol, Ali Murat Sünbül

In this study, "Math Outcome expectation Scale" which was developed based on Social cognitive career theory by Shoffner (2006) is aimed to be adapted to Turkish. Research's study group is formed by 379 middle school students. Confirmatory factor analysis (DFA) and exploratory factor analysis (AFA) have been used to determine scale's construct validity. Cronbach alpha values have been calculated for determining scale's reliability. Analyses have been realized by SPSS and AMOS program being used. According to results obtained, it has been understood that five factor structure of scale is compatible (CMIN/DF=1,797; CFI= .953; NFI= .900; GFI=.911; RMSEA= .046) with the data collected and scale's dimensions have enough internal consistency coefficient (.859, .812, .871, .830, .878, .773). The results obtained show that 'Math Outcome expectation scale' which is adapted to Turkish can be used to determine middle school students' outcome expectations towards maths.

Keywords: Math outcome expectation, Scale, Social cognitive career theory, Outcome expectation

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ADAPTATION OF TEACHER EFFICACY AND ATTITUDES TOWARD STEM (T-STEM) SURVEY INTO TURKISH

Yasemin Tas, Sündüs Yerdelen, Nurcan Kahraman

STEM (Science, Technology, Engineering, and Mathematics) education has become an important issue and enhancing students' STEM learning has been focused by researchers (McMahon & Showers, 2011). In their study with Turkish students, Korkut-Owen, Kelecioglu, and Owen (2014) found that high school graduates' choices in physical science has declined from year from 2002 to 2012 while their choices of engineering was stable through these years. According to Sadler, Sonnert, Hazari, and Tai (2012), at high school, students' interest toward STEM careers are stable. Furthermore, students' interest level is highly related to their choosing a major in STEM fields at college. Therefore, Sadler et al. emphasized the importance of pre-high school activities for students' future career choices. By considering this issue, the role of elementary and middle schools in students' career interest and career choices can be considered critical. In order to prepare our students for 21st century conditions, we need to equip them with required STEM skills. Teachers are one of the important factors in students learning outcome. Therefore, elementary teachers are expected to have positive attitude and efficacy for STEM teaching to encourage students to have positive attitudes towards STEM fields. To determine Turkish elementary teachers' attitude toward STEM, the present study aims to translate and adopt Teacher Efficacy and Attitudes Toward STEM (T-STEM) Survey into Turkish. T-STEM survey was developed by Friday Institute for Educational Innovation (2012). In this study, we will gather data from elementary school teachers working in different cities of Turkey. Confirmatory factor analysis will be conducted in order to investigate factor structure and reliability analysis will be run to examine internal consistencies of subscales. This study will provide a measure for assessing teachers' teaching efficacy and attitude toward STEM and help to figure out Turkish elementary teachers' STEM teaching profile.

Keywords: STEM education, Elementary teachers, Attitudes toward STEM, STEM teaching efficacy

ADITIONAL MOBILE LEARNING IN AN INCLUSIVE UNIVERSITY SETTING

Ursula Walsh

A key aim of my ongoing research is to examine the concept of inclusive mobile learning, especially in relation to the new generation of mobile learning tools and strategies that are now available to an increasing number of learners. Recent research studies provide concrete examples of classroom environments in which technology has made a positive difference in the learning outcomes of students who may be at risk of failing courses or of dropping out completely and that has helped to assist students with physical or learning disabilities. The apps chosen were selected based on the suitability of the app to aid the students with their academic progress and to select one or more that suits their disability. Specifically, this research will identify three important components to successfully using technology with the students who have a disability: The process of identification will be through feedback from the student learners as to the helpfulness of the app/s in improving their learning progress. The following descriptors will be used for the identification purpose. Interactive learning: technology to explore ideas and information, enhance learning and aid positive learning outcomes. Accessibility of device: Fits the individual needs of the learner. Inclusivity: Enables the learner to participate equally with the class. As the number of adult students with disabilities in our University increases, Students, Staff and Faculty are challenged to meet the needs of this population and ensure accessibility to course content. One aspect of support for students with disabilities is providing assessment and subsequent training in the use of assistive technology through the use of apps and or AT (assistive technology). There seems to be little difference between educational and assistive technology; they can be used together or separately. Assistive technology seems to be a personal choice for individual learners enabling them to choose specific technology to fit their personal needs, whereas educational technology (the use of apps /Computers) is more whole classroom-based enabling learners with a disability to be a part of the whole class. However, the distinction is becoming blurred as, for example, visual supports for literacy are used in classrooms and as computers are being used more often in all areas of education (South Carolina Assistive Technology Program (SCATP) December 1, 2014). Finally, the most crucial aspect of any research according to Unger (2012), should be listening to the voices of the students and this is often missing. It is of particular importance when working to support students who have additional needs. Most of our learners are from the generation that has grown up with frequent use of technology, and they are both experienced in and comfortable with the use of the technology. Current technology is suggested as being a positive advantage for all students in all classrooms. The consensus of current research into inclusivity and students with extra needs stresses that inclusivity means ensuring that learners who need extra support are able to contribute from and contribute to, the classroom environment. Many teachers however, are still reluctant to include learners who have addition needs and are unaware of the technology available to assist in that inclusivity. This imbalance needs to be addressed so that both student and educator can work together to ensure the best learning outcomes for all today's students. This research is working closely with the learners participating in the research to ensure their needs are met.

Keywords: Mobile learning, Inclusivity

ADVANCED EDUCATION TECHNOLOGY: VIRTUAL REALITY SIMULATION FOR MARINE FIRE FIGHTING TRAINING

Yalçin Durmuşoğlu, Gazi Koçak

There are mandatory education programs for safety of life at sea. One of these programs is fire-fighting training on board ship. The fire-fighting training is an applied training which necessarily consists of basic and advanced levels. Because it is applied training, it has some advantages and also some disadvantages. In

the applied fire training a real fire is started and real fire extinguisher is used. That's why these trainings are very expensive, harmful to human health and environment and have risk for human life. The developing technologies are promising to eliminate these disadvantages. One of these technologies is virtual reality. It is possible to simulate realistic environment and make the trainings very close to real fire-fighting using virtual reality glasses and some other equipment such as heat generator, breathing apparatus, fireman outfits etc. Thus, the trainers will realistically feel the fire while the risk for human life and damage to environment will be eliminated. Besides, the training expenditures will be reduced because the real equipment is not used. Even more, it is possible to simulate different environments and scenarios for different types of ships and different fire types. In this study, the fire-fighting training of seafarers is inspected and the contribution of virtual reality technology to these trainings is discussed.

Keywords: Environment, Marine, Risk, Virtual reality, Fire training

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AN EDUCATIONAL APPLICATION OF 3D PRINTING TECHNIQUE USED FOR INSOLE PRODUCTION

Hasan Kemal Surmen, Faruk Ortes, Yunus Ziya Arslan

In this study, it was implemented a biomechanical application of 3D printing technique for insole production. Basically, in terms of the arch height, there are three foot types including high, normal and flat arch. Moreover, if the alignment of the foot is taken into account, foot types can be classified as neutral, supinated and pronated foot. Each foot class has different shape and foot size. An insole is a device that is placed into the shoes to provide comfort and to correct the alignment of the lower limbs. Design of the insoles could be implemented according to specific foot geometry of subjects. These kinds of insoles are called generally as customized insole and have total-contact characteristics. Total-contact insoles are effective in reducing pain as distributing the pressure and improving the foot function. To produce a total-contact insole, the geometric data of foot plate surface should be known. In order to carry out this task, molding process is widely performed. Advances in scanning technology enable insole designers to obtain 3D CAD (three-dimensional computer-aided-design) model which represents the shape and dimensional data of an object. The model, namely, solid model could be imported to various commercial or educational software and be modified for special purposes. Therefore, molding process is discarded and molding cost is prevented with the method of 3D scan. Many 3D scan devices exist to obtain 3D data that may require high cost for an insole device. Thus, people even not having engineering background could obtain 3D foot model using various free available image capturing programs integrated in a mobile phone. In this educational application, it is aimed to manufacture a customized full-contact insole by means of a 3D printer and a 3D scan mobile application. The scanning software, which combines the photos of the object captured from the different angles, was used to obtain 3D CAD data of the geometrical shape of the foot in this study. Then, the data was imported as a model to a CAD software and modified for a subject shoe. Next, the model was converted into STL file format and imported to a 3D printer device. Finally, the solid model of the insole was printed and placed into the shoe. By taking advantage of new facilities of technological improvements, subject specific insoles could be designed and manufactured. These kinds of educational applications regarding 3D scanning and printing technologies have the potential to increase the prevalence of use of custom made biomechanical instruments which are developed to increase the quality of daily life of human being.

Keywords: Insole design, Scientific education, 3D printing

AN EFFECTIVE METHOD FOR PRE-SERVICE PROFESSIONAL DEVELOPMENT OF TEACHER CANDIDATES: LESSON STUDY

Ahmet Akçay, Serdar Safali

An important stage of the pre-service education periods of teacher education is a period in which teacher candidates' domain knowledge and Professional knowledge are attempted in terms of development and general culture. One of the most important objectives of the pre-service education is training the teacher candidates according to the needs of our era. The oportunity that teacher candidates practice the theoretical knowledge they have learned, is provided through the experience of schools and teaching practice lessons during this period. Teacher candidates enhance their experience by observing experienced teachers with practical courses and they obtain necessary knowledge and skils for their future professions. Although Teacher candidates often do practice in these courses, they don't have enough information about their performance in the courses because of not evaluation of these courses. In this respect, teacher candidates should use methods that give support to the development of each other in coorperation with the other teacher candidates. One of these methods is the class research that is called lesson study. The first practice of the "lesson study" was held in Japan, than It is implemented in many countries of the World. This method that is called kenkyujugyo (Jugyo: Lessons; Kenkyu: study) in Japanese, is based on participating in to each teachers' lessons and planning the each lessons that teachers participated. At the end of the study, how "lesson study" is applied with teacher candidates during pre-service lessons like teacher practice, the effectiveness of this method are discussed and various opinions have been presented on the use of this method.

Keywords: Lesson study, Teacher candidates, Pre-service, Professional development

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AN EXAMINATION OF 7TH GRADE STUDENTS' MISTAKES IN ALGEBRAIC EXPRESSIONS

Alattin Ural

The aim of this study is to determine students' achievement rates in algebraic expressions and the mistakes they made. 100 7th grade students from 4 different schools in the center of Burdur attended to the research. The study is a qualitative research, which was carried out in the survey design, and the data was analyzed using descriptive analysis. A test that consisted of 6 open-ended questions about algebraic expressions was used as the measurement tool. During the development of the questions, algebra learning area of the 7th grade was considered as the scope. A 9-question test was developed by consulting expert and teacher opinions in the first place. This test was applied in a 7th grade class and 2 questions were excluded as they were not appropriate in terms of difficulty levels, and also, some questions which caused problems in understanding were revised. The students' achievement rate is 68% in addition operations in the algebraic expressions, 43% in expressing a verbal expression algebraically and 26% in expressing a geometric representation as an algebraic expression. Their overall average is 69%. Looking at the reasons behind the mistakes from a broader perspective, it was determined that the main reasons were failure to attribute a meaning to the unknown and therefore doing the operations by assigning a value to the unknown. In other words, it could be asserted that failure to understand the main idea of algebraic expressions (the concept of variable and the concept of algebraic expression involving variables) as a concept properly is the major reason.

Keywords: Algebraic expressions, Conceptual learning, 7th grade students

AN EXAMINATION OF PARENTS' INVOLVEMENT AND SUPPORT FOR THEIR CHILDREN IN MATHEMATICS AND SCIENCE

Judith Monsaas, Tugce Gul, Rosalind Barnes-Fowler

Parental involvement in their children's education has been a growing topic of interest; researchers suggest that it has a positive influence on children's learning, including improving their view on life (Lamborn et al., 1991; Sanders & Lewis, 2004), interaction with peers (Trusty, 1998), educational outcomes in science (e.g. Ratelle et al., 2005; Mousoulides, 2013) and mathematics (Crane, 1996; Wang & Wildman, 1996). This study investigated parents' valuing of mathematics and science for themselves and their children, and the amount of support that they provide to their children. The participants were parents of students in grades 1-8 (N=4313). Parents completed an instrument adapted from set of student motivation scales developed by researchers at the University of Michigan (Karabenick & Maehr, 2008). Results showed that parents valued mathematics over science, and they provided more support to their children in mathematics than science. On one scale, science was rated higher than mathematics -- parents found science more interesting than mathematics. The mean scores were all over the midpoint indicating positive responses for both subjects. Results are also reported by parental education level and race/ethnicity.

Keywords: Parent involvement, Parent support, Mathematics, Science

AN EXAMINATION OF THE RELATIONSHIP BETWEEN MOTIVATIONAL BELIEFS AND MATH ANXIETY OF MIDDLE SCHOOL 7TH GRADES STUDENTS

Eyup Yurt

The relations between motivational beliefs and math anxiety were examined in this study. The research was carried out with 263 (132 female and 131 male) 7th grade students who are in different schools in the center of Konya. Motivated strategies for learning questionnaire was used to determine the motivational belief of students and math anxiety scale was used to determine their math anxiety. Pearson Product-Moment Correlation Coefficient and Multiple Linear Regression Analysis were used in the analysis of the data. According to the results, there are high, medium and low-level significant relations between motivational beliefs and math anxiety. The order of importance of motivational beliefs on math anxiety is as follows: self-efficacy, test anxiety, task value, control beliefs, extrinsic and intrinsic goal orientation. Self-efficacy, test anxiety and task value, are significant predictors of math anxiety. Control beliefs, extrinsic and intrinsic goal orientation have not a significant effect on math anxiety. The variables that predict the math anxiety explain nearly 65% of the change in math anxiety.

Keywords: Motivational beliefs, Math anxiety, Middle school students

AN EXAMPLE STUDY FOR TEACHING ALGORITHM STRUCTURE USING GAMES IN COMPUTER SCIENCES

Davut Alan, Şakir Taşdemir

Algorithm is the one of the key topics of computer sciences. Although it is such an important issue, understanding the algorithm logic is pretty hard for many students. In addition, there is a common understanding about this subject to be learned hard and a negative preconceive between students. Consequently, most of students prefer to memorize the software programming codes instead of understanding the algorithm. This situation causes the students to be unsuccessful in this kind of lessons. Everybody likes playing games for spending their leisure time or having fun with different ways. When this funny activity is integrated to the lessons, it helps the students to learn the subjects easily and in an entertaining way. Many academic studies have findings about that game-supported education yields better results. In the scope of this study, an educational computer game is designed to take advantage of game-supported education, to teach algorithm structure which is a key issue of computer science lectures. The game is prepared by using Kodu Game Lab software, which is a product of Microsoft Corporation. The reason why this software is preferred is to present a three dimensional and enjoyable environment for the students. There are two robot characters in the game and these characters act according to for-loop condition in their routes. The information about next operations and the counter has been shown to user at the end of every movement. Thus, the work logic of for-loop has been taught visually and in a funny way. The main aim of this study is to provide a three dimensional environment example to assist the teaching of algorithm structure in computer science by game-supported education methods. It is believed that, the algorithm structure education which will be carried through using this kind of prepared educational computer games will yield better results in learning for-loop.

Keywords: Computer education, Game-supported education, Kodu Game Lab, Edutainment

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AN INTERACTIVE APP FOR STEM LEARNING IN MOBILE DEVICES

Mauro Figueiredo, Arif Solmaz, José Rodrigues

Low achievement in mathematics education has been an increasing problem in several countries. According to a 2010 study from the U.S. Department of Education, blended learning classes produce statistically better results than their face-to-face. An advantage of this approach is that it increases the flexibility and individualization of student learning experiences. The recent availability of smartphones and tablets with increased processing power and usability, accessible on a large scale, allow an exponential expansion of social and participative web technologies. It is also important to note that these students are the generation of digital games and social networks. We cannot ignore that they are no longer the same for which the education system was designed a few decades ago. In this context it is wise to consider the integration of digital media and mobile devices allowing students to set personal goals, to manage educational content and to communicate with others in the right context. In this paper, we present the design and development of a mobile application for the teaching and learning of mathematics. Students can use this app in the classroom or outside the classroom in a blended learning model to solve problems. When students have difficulty in solving a problem they can watch the resolution of it. In this way, we want to provide the same opportunities to low-achieving students that may struggle to learn the materials covered in class. Students have also access to complex problems that may provide additional stimulation for top performers students. In this way, we can provide a platform that is capable of accommodating students with different mathematic skills.

Keywords: Augmented reality, Mobile devices, Educational apps (or apps in education), Mathematics education, Blended learning, Game mechanics

AN INVESTIGATION OF FACTORS AFFECTING PRE-SERVICE SCIENCE TEACHERS AWARENESS IN RENEWABLE ENERGY SOURCES

Osman Mutlu, Yüksel Köseoğlu

Nowadays, due to increasing energy demands and environmental problems in burning fossil fuels (coal, oil, and gas), interest on renewable energy sources has been increased. Fossil fuel reserves are not finite and global reserves of fossil fuels are expected to diminish in near future. Therefore, the scientists try to find new and more effective ways to replace fossil fuels with renewable energy resources. Renewable energy resources, which may be practically inexhaustible, could play a very important role in the future energy supply strategies of the entire world. It is really important to determine preservice science teacher's awareness level about renewable energy, who will be bringing up future generations of school children. The purpose of this study was to develop and validate a multidimensional Renewable energy awareness and attitude scale for preservice science teachers (Physics, Chemistry and Biology) at three different state universities (Suleyman Demirel University, Mehmet Akif University and Pamukkale University). First of all, a literature review was done and then 30 preservice science teachers from different areas (physics, chemistry and biology) were asked to write a composition about their feelings, opinions, and attitudes towards renewable energy. An item pool was constructed from the literature and compositions written by participants. Then, item selection took place using qualitative and quantitative methods: Expert-analysis was used for screening the relevance. Explorative factor analysis (principal component analysis) was used to investigate the structure of the scale. According to analysis, the renewable energy awareness scale was validated in different dimensions. Differences in renewable energy awareness level between male and female participants were analyzed using an independent t test. This study has also investigated the relationship between renewable energy attitude and awareness of preservice science teachers. An independent T test was calculated to determine, if there were a mean score differences between female and male for renewable energy awareness. On average, male participants had greater average (M = 4,06, SE = 0,54) than to female participants (M = 3,99, SE = 0,50). But this difference was not significant t(124) = −0.705, p > 0.05; it represents an effect of r = 0.003. The average renewable energy awareness of preservice science teachers was found as 3.93 out of 5.00 for teachers who did not get any course and 4.13 for teachers who got a course about renewable energy, respectively. Any effect of teachers' subject (physics, chemistry and biology) on renewable energy awareness was observed. There were no statistically significant differences between group means for physics, chemistry and biology teachers as determined by one-way ANOVA.

AN INVESTIGATION OF TEACHERS' VIEWS ABOUT THE INTEGRATION OF SCIENCE AND TECHNOLOGY INTO TEACHING MATHEMATICS

Ceylan Şen, Zeynep Sonay Ay

Technology as an indispensable part of life features as an effective tool in teaching environments. Following the developments in technology, technological tools and software used in teaching environments have begun to show variety (MEB, 2013). The integration of various technological tools in teaching mathematics brings in benefits including facilitating and materializing its teaching (Kissane, 1996; Lesh, 1990). Moreover, the curriculum designed by MEB (the Ministry of National Education) (2013)

underscores the importance of associating mathematics with other disciplines and daily life in order to make its learning meaningful and permanent. Associating science, which is a part of the daily life itself and a different discipline, with mathematics positively impacts teaching (Friend, 1985; Childress, 1994; Hill, 2002). In this regard, the integration of technology and science into the process of teaching mathematics is considered to be effective. This study was carried out with 15 voluntary mathematics teachers working in the randomly selected secondary schools. The study is designed as a case study that holistically describes a specific case by analyzing its results (Yıldırım & Şimşek, 2008). A semi-structured interview form consisting of 4 open-ended questions developed by the researchers was used as the data collection tool. The data obtained from the interviews were analyzed and reported by using content analysis method. The study indicated that the teachers were in a clear consensus about their interdisciplinary approaches and the integration of technology in teaching mathematics. Also, the study highlighted that the teachers had not received training on and thus, were not enough knowledgeable about the integration of science and technology into teaching mathematics because of these reasons they have a difficulties.

Keywords: Teaching mathematics, Integration of science, Mathematics and technology, Elementary mathematics teacher

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AN INVESTIGATION OF THE FACTORS AFFECTING INNOVATION PERCEPTIONS OF MATHEMATICS, SCIENCE AND SOCIAL SCIENCES TEACHER CANDIDATES

Emin Aydin, Mehmet Ali Çorlu

Mathematics and science education carry a vital role in the development of the 21st century skills and positive attitudes towards innovation in the next generation. Developing innovation/entrepreneurship skills is important for the Turkey's vision for its integration to the technologically developed international community. Preservice training of future science, social sciences and mathematics teachers is especially important since the highly qualified technology workforce is the outcome of high quality education at the pre-university level. In that regard the aim of this study is to investigate the factors affecting innovation perceptions of science and mathematics teacher candidates. The study collects data from a sample comprises of 200 second year students in science, social sciences and mathematics teaching departments. The primary aim is to measure the correlations of five personality variables and innovativeness perception. The data collection tools are the Turkish version of the Individual Innovativeness Scale (IS), and the Big Five Personality Scale (Big5).

Keywords: Teacher education, Innovation perceptions, personaility

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AN INVESTIGATION OF THE INNOVATION PERCEPTIONS OF ENGINNEERING STUDENTS IN A HISTORY OF SCIENCE AND TECHOLOGY WORKSHOP

Mehmet Ali Çorlu, Emin Aydin

Developing innovation/entrepreneurship skills is important for the Turkey's vision for its integration to the technologically developed international community. Engineering education is especially important since the highly qualified technology workforce is the outcome of high quality undergraduate education. The role of engineering education in the development of the 21st century skills and positive attitudes towards innovation is vital. In that regard the aim of this study is to investigate the innovation perceptions of

engineering students. The study collects data from a workshop that was integrated into the first five weeks of the history of science and technology course in a private university in Istanbul. The sample comprises of 100 second year engineering students. The study will follow an experimental design (50 in the experimental and 50 in the control group). The data collection tools are the Turkish version of the Individual Innovativeness Scale(IS), and the Big Five Personality Scale. The IS will be administered once and the Big Five scale will be given at the end of the program as one time only pre and post treatment test to both groups. The experimental group receives instruction based on a workshop that is based on a method in which students are required to explore examples of innovation/entrepreneurship in the history of science and technology. The role of the instructor is to provide the guidance in the process. In the control no such treatment is available. Data will be collected in February 2016 and will be analyzed in March.

Keywords: Engineering education, Innovation perceptions, Personaility, History of science and technology

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AN INVESTIGATION OF UNIVERSTY CHEMISTRY STUDENTS' UNDERSTANDING OF PRECIPITATION TITRATIONS AND RELATED CONCEPTS THOROUGH VEE-DIAGRAMS

Nuri Nakiboğlu, Canan Nakiboğlu

Laboratory work is one of the fundamental components of undergraduate chemistry courses. If the experiments are conducted in a meaningful way, the laboratory study can provide students with opportunities to engage in a process of constructing knowledge. The Vee-diagram was developed by Gowin to enable students to understand the structure of knowledge and the process of knowledge construction. The conceptual side of Vee diagram includes philosophy, theory, principles / conceptual systems, and concepts all of which are related to each other and to the topic which is studied in the experiment. Thus, it can provide to explore students' knowledge structure and be used as an assessment tool at the same time. Precipitation titrations are also an important part of analytical chemistry classes and common experiments carried out by students in analytical chemistry laboratories. The fundamentals of precipitation titrations are generally explained by selecting argentometry which is a volumetric titrimetry technique used known amount of silver nitrate solution as a titrant or reagent. Mohr, Fajans and Volhard methods are three common argentometric methods. In this study, second year chemistry students' understanding of essential concepts related to precipitation titration was investigated by using Vee-diagrams which are completed during the analytical laboratory course. Three Vee-diagrams concerning three argentometric titration methods were constructed prior to the laboratory study by taking into laboratory manual by the researchers. Vee- diagrams delivered to the students after completing each experiment one by one in the laboratory. Nineteen analytic chemistry students from two faculty participated in the study. It was found that the students were insufficient to define some concepts such as argentometry, precipitation, back titration and indicator. it was also concluded that the students had the calculation difficulties especially for the back titration.

Keywords: Precipitation titrations, Vee-diagram, Analytical chemistry laboratory, University students

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AN INVESTIGATION ON PROSPECTIVE BIOLOGY TEACHERS' COGNITIVE SCHEMATA RELATED WITH THE CONCEPT OF "SCIENCE CENTER"

Ipek Pirpiroğlu, Semra Mirici, Fitnat Köseoğlu

Abstract: Not only in Turkey but on an international scale there has been a dramatic increase in the negative attitude of students towards science and technology (OECD, 2006). Since early 2000's, there has been a growing interest in the scientific researches on out-of-school learning environments such as science centers in order to improve both science-society interaction and the quality of education at schools. School field trip to such learning environments have positive influence on students' attitude, self-awareness, self-confidence, self-efficacy, and personal efficiency; and help them develop their personal and social skills such as communication and creativity. Students' participation in the classroom activities and their positive attitude towards science increase when teachers associate curriculum achievements with the activities presented in the out-of-school learning environments such as science museums and science centers. In this study, conducted as part of the "BİLMER Project" with code number 114K646 and funded by TUBITAK 1001 program, it was aimed to examine prospective Biology teachers' cognitive schemata about science centers as informal learning environments. The Word Association Test was used as the data collection tool. The study group comprised students from 1st to 5th class in the Biology Teaching Department of a university in Ankara. These prospective teachers were invited to write down, in a certain period of time, the words which were reminded by the key terms, Informal Learning Environments, Science Center, Science Museum, and Science Communication. The data obtained were classified in a frequency table in accordance with the responses of the prospective teachers about the key terms. Concept maps were created out of the data collected in order to illustrate their cognitive schemata. In this way their cognitive schemata was determined through examining whether they wrote Science Center under Informal Learning Environment; Learning-Teaching-Edutainment, Science Show, Science Exhibition, and Science Workshop under Science Center; History of Science and Nature of Science under Science Museum and Scientist, Society, Media, Popular Science, and Science-Technology Policy under Science Communication.

Keywords: Informal learning environments, Science center, Prospective biology teachers, Word association, Cognitive schemata

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ANALYSING PROVING PROCESS OF A PROSPECTIVE ELEMENTARY MATHEMATICS TEACHER IN THE CONTEXT OF PROOF IMAGE

Serkan Narli, Esra Aksoy, Ozan Pala, Yusuf Emre Ercire, Melike Uysal

Proving activities have an important role in learning and teaching of many mathematical topics at university level. In the literature of mathematics education, studies emphasize that the difficulties experienced by university students in the proving process need to be detailed. To do so, this study aims to explain how the proving process is shaped by its cognitive and emotional components. With this purpose, a proving process was analyzed via proof image theoretical framework introduced by Kidron & Dreyfus (2014). Proof image is a mental image which includes cognitive and emotional components for the proof. In this study, data were collected from students who were taking abstract algebra at a state university by implementing two-stage sampling method. In the first stage, a questionnaire consisting of two open-ended questions was applied to120 students, and task based interviews were conducted with three students who answered those questions correctly. To analyze data, content analysis was conducted. One student's proving process was presented in this paper. The student, named as M, developed intuitive reasoning at the beginning of proving process. However, later on, it was observed that she related her intuition with inaccurate concepts (such as subgroup, etc.), thereby making incorrect logical connections. Besides, it could be said that M's approach to the proof in this process was holistic and dynamic, while comprising her

personal features. Moreover, it was observed that, as a complementary part of cognitive activities, affective accuracy was involved in the process at certain points. Consequently, it was found out that M was able to construct an image for the proof; however, she couldn't reach formal proof due to the insufficiencies caused by some components. It might be said that the main reason for this situation is her mistaken prior knowledge and the connections established between them.

Keywords: Proof, Proof image, Algebra, Mathematics education

ANALYSIS OF 10TH GRADE TEXTBOOK FUNCTIONS UNIT CONTENT WITH ANTHROPOLOGICAL THEORY OF DIDACTICS

Mustafa Gök, Abdulkadir Erdoğan

The aim of the present study is to examine "operations with function and applications of functions" unit in tenth grade mathematics textbook within the framework of Anthropological Theory of Didactics (ATD). Document analysis, a qualitative research method, was used in the study. Thus, mathematics textbook, which was distributed free to students by Ministry of National Education in 2014 – 2015 academic year, was examined within the context of the main analysis method of ATD, namely praxeological analysis. Analysis results demonstrated that most of the tasks identified in the textbook were solved with algebraic and graphical techniques. Tasks were generally solved with one technique and alternative techniques were not utilized. In addition, on certain techniques, technological explanations on the validity of the technique used were also provided. It was considered that solutions of the tasks using more than one technique would have positive contributions on instruction.

Keywords: Anthropological theory of didactics, Praxeological analysis, Textbook, Functions, 10th grade

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ANALYSIS OF ALGEBRA TEACHING KNOWLEDGE OF PRE-SERVICE ELEMANTARY MATHEMATICS TEACHERS

Feriha Hande Idil, Serkan Narli

The aim of this research is to analyse the algebra teaching knowledge of pre-service elementary mathematics teachers by benefiting the theoretical framework of "Mathematical Knowledge For Teaching" developed by Ball, Thames and Phelps (2008). The scope of the research consists of the major students studying at the Buca Education Faculty, Department of Elementary Mathematics teachers of the Dokuz Eylül University in the province of İzmir. The research is a descriptive study of qualitative type. The present situations of the pre-service teachers regarding the subject matter and pedagogic knowledge were described by analysing their algebra teaching knowledge. Two data collection tools were utilized for obtaining the mentioned knowledge. These are "Familiarization with the Pre-service Teachers Form", and "Knowledge Acquisition about the Components Form". It is aimed to learn about the personal backgrounds and experiences of the teachers by use of the form prepared for familiarization with the pre-service teachers. The data about the components of the the theoretical framework of Mathematical Knowledge for Teaching were obtained, in turn, by using the "Knowledge Acquisition about the Components Form". While preparing these questions the article "Content Knowledge for Teaching – What makes it special?" authored by Ball, Thames and Phelps (2008) was benefited. The form consists of a total of fifteen questions about the four components of the model. The necessary data were obtained from 195 pre-service teachers

using mentioned forms. It was attempted to reach to some general results about the research problems by continuously comparing the factors arising as a result of the analysis of each data resource. In this direction, content analysis were utilized in the data analysis. As regarding the results of the study, it was determined that there were deficiencies in the algebra teaching knowledge of the pre-service teachers. The mentioned deficiencies are concentrated especially on the Specialized Content Knowledge component of the theoretical framework.

Keywords: Mathematical knowledge for teaching, Algebra, Pre-service teacher, Mathematics education

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ANALYSIS OF ANALOGIES USED IN NEW TENTH GRADE BIOLOGY TEXTBOOKS

Musa Dikmenli, Osman Çardak

Biology textbooks are one of the most frequently used effective teaching materials at secondary education. Students and teachers are known to rely on, believe in and be highly faithful to textbooks. Biology textbooks should be analyzed at different dimensions so that students can properly make use of them. Analogies are one of the topics which need to be analyzed in the biology textbooks of secondary education. Studies have shown that despite being frequently sought in biology textbooks, analogies are usually used randomly. Analogies which are not configured based on certain teaching models are known to result in misconceptions in the students. Besides that, the analogies, which are suitable for the cognitive level, chosen from daily life and well configured, bring about many benefits such as motivation and concretization for the students. It was suggested that analysing the analogies which are used in the 10th grade biology textbooks would contribute to students, teachers and programmers. This is because this textbook is a new textbook prepared according to secondary education biology schedule which was updated in 2013. The purpose of this research is to research the types, frequencies of the analogies which are used in the new secondary education biology textbook, and how they are configured and presented. The textbook which was examined in the research is a material which is used at all high schools in Turkey upon the recommendation of the Ministry of National Education. The analogies in the book were analyzed in terms of the level of target concept, the analogical relationship between source and target concepts, the presentation format, the level of abstraction of the source and target concepts, the position of the source relevant to the target, the level of enrichment and the limitations of the analogy. In the data analysis process, document examination technique was used. The results showed that the analogies in the new 10th grade secondary education biology textbook were used in the similar frequency with the previous secondary biology textbooks. It was also determined that analogies were structured in the functional, verbal, concrete-abstract, simple, and embedded activator types. Additionally, it was seen that the limitations of the analogies were not emphasized enough. The results were discussed with literature and suggestions were developed.

Keywords: Analogy, Biology textbook, Teaching

ANALYSIS OF BIOLOGY CONTENT KNOWLEDGE TEST ACCORDING TO COGNITIVE PROCESS DIMENSION OF REVISED BLOOM TAXANOMY

Aylin Kala, Mustafa Çakir

The aim of this study was to analyze questions of 2013 biology content knowledge test in civil servant selection examination (KPSS) according to knowledge and cognitive processes dimensions in revised Bloom taxonomy. Following research questions were guided the study: To what extend 2013 biology content knowledge test in civil servant selection examination (KPSS) represents knowledge and cognitive processes dimensions of revised Bloom taxonomy? This is a qualitative research in which descriptive content analysis approach was employed and data was collected through document analysis. During data analysis, descriptive analysis techniques have been used to answer the research question. Biology teaching content knowledge test's questions have been classified according to the criteria presented in the book A Taxonomy for Learning, Teaching, and Assessing-A Revision of Bloom's Taxonomy of Educational Objectives'. 2013 biology content knowledge test questions were coded using performance indicators and revised Bloom taxonomy separately. According to the research findings questions in 2013 KPSS biology content knowledge test did not homogenously represent levels of knowledge and cognitive processes dimensions of revised Bloom taxonomy. In cognitive processes dimension questions were mostly in category of understanding (42%) and there was not any question in either categories evaluate or create. In knowledge dimension questions were mostly in conceptual category (75%) and there was not any question that required metacognitive knowledge. Since standardized testing has a significant importance on the appointment of teachers to the public schools and plays a crucial role for pre-service biology teachers' social and professional well-being both performance indicators and knowledge levels should be better considered in preparation of such a high stake exam.

Keywords: Biology content knowledge test, Revised bloom taxanomy

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ANALYSIS OF PROSPECTIVE CHEMISTRY TEACHERS' VIEWS ON MODELS ACCORDING TO SOLO (STRUCTURE OF OBSERVED LEARNING OUTCOMES) TAXONOMY

Cem Gültekin, Canan Nakiboğlu

Chemistry is not an easy subject to understand because of abstract nature of chemistry concepts. For this reason many students have difficulties in learning chemistry. Models play a vital role in teaching and learning chemistry concepts and help students to form concrete ideas about abstract concepts. It is essential that the prospective chemistry teachers have an appreciation of what 'a model' is and that definition should be congruent with the one that is accepted by scientists. Besides they have to learn that why and how models are used in chemistry teaching. The SOLO taxonomy describes level of increasing complexity in a student's understanding of a subject through five stages. In this study it was investigated prospective chemistry teachers' views on: the nature of models and the use of models and modelling in chemistry teaching by using SOLO taxonomy. A qualitative study was performed on 16 prospective chemistry teachers who attended the fifth grade. Given the fact that the prospective teachers came across to a number of models both at the chemistry lessons and during their branch training, the study group was selected according to the criterion sampling method which is one of the purposeful sampling methods. Three open-ended questions were used as the data collection tool. The assessment scale, prepared by the researchers, was employed to make the descriptive analysis of what understanding levels on the SOLO prospective teachers' answers corresponded to. The views of the prospective teachers about the model definition were usually found to be in the pre-structural level, which is the lowest level and no view was identified to be at the highest level, which is the extended abstract. The prospective teachers' views regarding the use of models were generally in the pre-structural and unistructrual levels and no view in the extended abstract level could be identified.

Keywords: Models, Prospective chemistry teachers, SOLO taxonomy

ANALYSIS OF TECHNOLOGY ADDICTION OF HIGH SCHOOL AND UNIVERSITY STUDENTS USING DATA MINING TECHNIQUES

Meltem Kurt Pehlivanoğlu, Nevcihan Duru

The rapid evolution of technological devices also makes it increasingly challenging to determine which is the most needed. These devices have become addictive, especially for the young generation. In this study, we have made a survey was composed of 31 questions over total of 240 high school and university students to find out which criterions are related with each other in this survey. We have analyzed survey results using Apriori Algorithm that is one of the data mining techniques to ensure extracting some association rules. In the future, to increase social communication between individuals, based on these rules, a lesson about preventing technology addiction may be prepared than given to the students in high schools and universities to raise awareness.

Keywords: Analysis of technology addiction, Data mining techniques, WEKA, Apriori algorithm

ANALYZING AGENT FUNCTION DESIGN TEACHING IN ELECTRICAL ENGINERING EDUCATION

Mehtap Köse Ulukök, Özcan Demirel

In this study, the effect of chosen examples in agent function design teaching is aimed to be analyzed. Agent function design is one of the well known topics in artificial intelligence on robot design and its control. In addition to the classical teaching methods, agent function design has been taught in two different ways. Traditional problem solving method is used at the beginning of agent function design teaching. Then, one workshop has been organized before a quiz. Totally 22 number of students have been divided into two groups. Each group members are randomly chosen. Like in workshop, in the quiz, one group has been asked to develop an agent function for a given example, whereas the other group asked to create their own example. Each group needs to develop an agent function in a specific time. All the participants of the first group, those are expected to find a new example; choose the solved examples in lectures. Some of the students in the other group perfectly develop an agent function for a given new example. Results of the study revealed that students who asked to develop a new example require additional thinking than the ones that have an example. Both groups have been asked same questions in midterm and final examinations. Student's success on agent function design will also be analyzed.

Keywords: Teaching methods, Agent function, Robot design, Robot control

ANALYZING OF THE SECONDARY EDUCATION CURRICULUM IN TURKEY IN TERMS OF STEM EDUCATION: 7TH GRADE CURRICULUM

Serhat Kocakaya, Nihat Kotluk, Ömer Ensari

The aim of this study was to analyze the secondary school curriculum applied in Turkey corresponding to STEM education. The sample of this study was selected from 7th grade curriculum of Science and Technology, Mathematics, and Information Technologies courses. In this study qualitative research method, the document analysis technique was used. 7th grade curriculums were examined to determine whether the curriculums of STEM related courses meet the requirements of STEM education. When 7th

grade curriculums analyzed, it has been concluded that the curriculums applied are not correspond to STEM education approach. Modifications that needed for an appropriate curriculum to STEM education were discussed with its reasons.

Keywords: STEM education, Secondary education curriculum, Science, Mathematic, Technology

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APPLICATION OF ACTIVITIES INTENDED TO PERCEIVE NATURE OF SCIENCE FOR 5TH AND 6TH GRADE STUDENTS

Sema Küçükmert Ertekin, Burcu Aygen

The purpose of this study is to introduce two different activities in which students can understand nature of science fundamentally and to discuss the results of applied activities. The study is applied with the 5th and 6th grade students. In this study, there are two activities called "Scientific Knowledge" and "Direct and Indirect Observation" which are intended to perceive nature of science and to comprehend the importance of observation with the difference of objectives in science curriculum. While the students are thinking about nature of science with the activity called Scientific Knowledge, they realize that science has a dynamic structure based on application and science may change as knowledge changes. Students have taken an opportunity to improve observation and scientific inquiry abilities and also defend their own arguments with the activity of Direct and Indirect Observation. This study has been the first step for our students to study scientifically enabling to think scientifically, to reach scientific knowledge and realize its importance.

Keywords: Nature of science, Scientific knowledge, Direct observation, Indirect observation

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APPLICATION OF LABORATORY EQUIPMENT FOR POWER ELECTRONICS IN VOCATIONAL SCHOOL OF TECHNICAL SCIENCE

Hibetullah Kiliç, Musa Yilmaz, M. Emin Asker

Today PLC, servo motors, conveyor and pneumatic systems are necessary equipment and topics for industrial automation. Therefore for that issue is very popular for vocal schools and engineering faculties. The course are based on electrical-electronics and mechanical engineering have to support by additional practical materials. The aim of that paper is focused on PLC based training education such as Elevator training set, the conveyor training set and servo - pneumatic training set. The paper propose a brief usage of mentioned PLC based sets and their effects on electrical course education in vocational school of technical science.

Keywords: PLC, Servo motors, Pneumatic systems, Education in Electrical & Electronics, Technical science vocational school

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APPLICATIONS OF DAILY LIFE BASED SCIENCE EDUCATION TECHNOLOGY SUPPORT

Canan Altundağ, Murat Altundağ

Science and technology are today the greatest factors in changing the way we live. The aim of this study is to examine the effects of activities designed according to computer assisted education under the name of daily life science on students 'attitudes towards science, motivation for science course. In this research pre-test, final test, semi- experimental method with control group have been used. Study group of the research is constitute of 100 students who are constitute 50 control group and 50 experimental group. As data collection tool, "Motivation Scale towards Science Learning" was used, this scale was designed by Çavaş-Huyugüzel and Yılmaz (2007). Moreover, in order to get information about students' attitude, "Science Attitude Scale", which was developed by Geban (1991), was used. Attitudes and motivation scale for learning science have been applied to the groups before and after the research and data's were gathered. The data's were evaluated by SPSS 21.0. While evaluating data t-test was used for analyzing the data. According to the results gathered by the data's, positive results in the favor of experimental group were taken in the total scores of attitudes and motivation scale for learning science. As a result, it was determined that the computer assisted daily life based science teaching affected the attitudes and motivations of the students towards science. When the answers are examined, it was found out that the answers are changed according to the stipulation and the concern of the students. The results of this research show that if the quality of education and the usage of the technology are increased, it is going to influence the student's attitudes towards the computer assisted education. In the literature similar results are found. Also with this study, similar results are obtained. It is thought that our study will contribute to computer assisted education.

Keywords: Daily life events, Science education, Attitude, Motivation

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APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN ENGLISH TEACHING: AN OVERVIEW

İsmail Şahin, Gökhan Orhan

Language teaching and learning is becoming more sophisticated day by day thanks to application of technological innovations in classroom practice. In recent past, the number of application of ICT in English teaching and learning has been increased. The researches over English teaching with information and communication technology (ICT) suggest some evidence as to positive effects of the use of ICT on students' learning (Mumtaz, 2000). English language teachers have a tendency to use ICT as a tool to practice structural purposes, teaching unknown words, speaking and pronounciation, reading comprehension ,writing, listening. The aim of the study is to report which ICT applications are used in English teaching in practice and categorize ICT applications in relation to language skills and knowledge such as speaking, writing, listening, pronunciation and vocabulary by investigating the literature involving ICT applications in other countries.It is thought that the study will enlighten the researchers about the latest ICT applications and their effects on learners in English teaching.

Keywords: Information and communication technology, English teaching, Language skills

ASCERTAIN MISCONCEPTIONS OF TEACHER CANDIDATES OF PRIMARY SCHOOL TEACHING DEPARTMENT IN THE "FORCE AND MOTION" ISSUE AND CATEGORIZED THESE MISCONCEPTIONS IN AN ONTOLOGICAL SENSE.

Ayşegül Kinik Topalsan, Hale Bayram

In this study, it is aimed to ascertain misconceptions of students about basic physical concepts such as force, friction, work, conservation of energy, mechanical energy, kinetic energy, potential energy, energy stored by springs in the "Force and Motion" issue of secondary school seventh class curriculum and categorized these misconceptions in an ontological sense. This research is a descriptive study. The study group of this research is formed of students studying in a Foundation University in Istanbul in 2013-2014 academic year. The working group consists of 35 teacher candidates of 30 female and 5 male students studying in the 2nd Class of primary school teaching department. Before and after applications after physical concepts about Force and Motion Issue were examined and categorized ontologically examined 318 misconception due to placement to upper category and 131 misconceptions due to placement to lateral category.

Keywords: Ontological categories, Force and motion, Misconceptions

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ASPECTS OF USING CLOUD TECHNOLOGIES IN VIRTUAL LEARNING ENVIRONMENT

Taliko Zhvania, David Kapanadze, Mzia Kiknadze

There are increased using the e-learning technologies at the modern institutions of higher education, which favored to integrate the various instruments in the virtual learning environment. Recently, the cloud technologies have become the most popular, which offer e-learning internet technologies based dynamical and actual new opportunities to the educational institutions. The cloud technologies provide a high level of the service and they impact on the design of the training courses, offered services and logistics. Although, the cloud technologies include the new risks, at the same time their use for educational institutions and students can get a better service at the lower cost. In the article, it is discussed the comparative analysis of the learning services with the modern LMS systems and the cloud technologies and shown the perspectives of the implementation in the educational organizations.

Keywords: E-Learning technologies, Cloud technologies, Virtual learning

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ASSESSING COMPONENTS OF THE SCIENCE AND NONSCIENCE UNIVERSITY STUDENTS' MOTIVATION TO LEARN SCIENCE

Yüksel Altun, Sevda Serin

Science is a major contributor for our lives with many important innovations in its basic disciplines; biology, physics and chemistry. In order to participate effectively in the decision-making process, it is essential that all students—science and nonscience—become scientifically literate citizens. It is necessary to determine the effects of factors having influence on motivation level of the students to guide the educators in their quest for motivating students to learn science. This study's aim is to adapt Science Motivation Questionnaire II into Turkish from Science Motivation Questionnaire II developed by Glynn et al. (2011) for

measuring science and nonscience university students' motivations to science learning. Therefore, the present study aims to determine the factors that are related to it: both science and nonscience students' motivation to learn science and students' gender. For this purpose, firstly Science Motivation Questionnaire II developed by Glynn et al. (2011) for measuring science and non-science university students' motivations to science learning was adapted into Turkish. The Turkish version of Science Motivation Questionnaire II was applied to 1002 teacher candidates (638 science and 364 nonscience) studying Teacher Education at different universities in Turkey. The statistical findings suggest of the present study that the questionnaire is a valid and reliable tool for assessing components of Turkish students' motivation to learn science. After the analysis' it is determined that the science motivation questionnaire is formed from five factors. These factors are intrinsic motivation, self-determination, self-efficacy, career motivation, and grade motivation. The results of the data analysis revealed that the science majors scored higher than the nonscience majors on all of the motivation components. Among both science majors and nonscience majors, women had higher self-determination and grade-motivation than men. However, it was found that there is not a significant difference favouring the students between the average motivation scores for intrinsic motivation, self-efficacy and career motivation.

Keywords: Science education, Motivation, Questionnaire, Gender, Science students, Nonscience students

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ASSESSMENT OF 4-5-6-7TH GRADE SOCIAL STUDIES TEACHING PROGRAM IN TERMS OF TECHNOLOGY LITERACY DIMENSIONS

Ozkan Akman

Technology literacy is a person who has ability to question technological process and innovations critically. International Technology Education Association ITEA defined technology literacy as a person who knows what the technology is, how it was created, how it shapes the society and how it is shaped by the society. The person who can question technology realizes its effects on the society. Thus, individuals effect their future by effecting their environment. When 4-5-6-7th grade social studies teaching programs are examined in this regard, it was found that there were studies about presence of some acquisitions related to use of technology and about how studies for technology literacy were reflected on the program. But yet, purpose of training technology literate individuals was not make a perfect sense in the program. In this regard, the purpose of this study is to examine current social studies curricula in terms of technology literacy. This study was conducted by document analysis technique which is one of the qualitative research methods. As data collection tool, technology literacy table, developed by 4-5-6-7th grade social studies programs and erdaş et al. (2015), was used. According to data collected in the study, it was revealed that technology literacy has not been included in social studies program at desired level and it has not taken its place in the program properly.

Keywords: Social studies teaching program, Technology literacy, Technology education

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ASSESSMENT OF SECONDARY SCHOOL STUDENTS' SAFE INTERNET USAGE AND METACOGNITIONS

Murat Altundağ, Canan Altundağ

The increase of internet usage by people from all parts of society, especially children has increased the question of the importance of safe internet use. In the light of these, this study aims to determine the effects of student teachers' positive and negative metacognitive beliefs on their safe internet usage. The model of this research is "Based on Survey Model". Study group of this study consists of 225 secondary school students from various schools in Turkey. As data collection tool, "Metacognitive Skills Scale" was used, this scale was designed by Çetinkaya (2000). Moreover, in order to get information about students' safe internet usage, "Safe Internet Usage Scale", which was developed by Beder (2015), was used. The data obtained from this study is based on using frequency, percentages, arithmetic average and standard deviation and t-test. According to the results of research; the usage of safe internet, the awareness and metacognitions beliefs of pupils are generally higher. A higher level of consciousness that all secondary school pupils to release, the results of this research on raising awareness about the use of children on the internet for educational studies should be planned and should be done. The relationship between the metacognition and safe internet usage shall be analyzed in terms of other variables in order to contribute to the education literature.

Keywords: Safe internet, Conscious use of internet, Metacognition

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ATTITUDES OF PRE-SERVICE SCIENCE TEACHERS TOWARDS THE AIM OF SCIENCE EXPERIMENTS

Ela Ayşe Köksal, Fulya Öner Armağan

The purpose of this study is to develop attitudes toward the aim of science experiments scale. To determine the pre-service science teachers' attitudes towards experiments is the second objective of this study. In order to develop the scale, a questionnaire by Yıldız, Akpınar, Aydoğdu, & Ergin (2006) was used after their permission. This scale was originally developed for science teachers. It has 40 items and is one-dimensional. That scale was administered to pre-service science teachers at Erciyes University. The data are still being analysed. For reliability and validity of the results, both explanatory and confirmatory factor analyses will be performed. It is being expected that the developed scale will fill a gap in the literature regarding the aims of the experiments.

Keywords: Pre-service science teacher, Experiment, Attitude, Test construction

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BILMER PROJECT - SCIENCE EXPLAINER SURVEY

Eray Şentürk, Semra Tahancalio, Uygar Kanli, Fitnat Köseoğlu

Although it was determined by The Scientific and Technological Research Council of Turkey (TÜBİTAK) to build science centers in 81 provinces of Turkey as a part of \"Target 2023\", there has been no research intended to identify explainers' (guides') educational status, demographic characteristics, and their professional development needs that have been working at these centers. In this study, the development

process of "Science Explainer Survey" that was developed for the first time in Turkey thanks to "BİLMER Project" supported by TÜBİTAK with 114K646 code number to identify explainers' profile and professional development needs in our country will be presented and discussed. In the development process of survey, a draft questionnaire consisted of 31 questions was developed by examining especially the explainer surveys developed in DOTIK and PILOT projects supported by the European Union, publications of the world's advanced science centers (Exploratorium, London Science Museum etc.) and also specific magazines directly related to science centers (Dimension, ASTC etc.) beside the examination of the related literature. In pilot study, the survey was implemented to eight explainers in three different science centers during the visit of project team to these centers [Feza Gürsey Science Center (n = 1), Bursa Science Center (n = 2), Eskişehir Science Center (n = 5)]. After implementation, the views of explainers for each item in the survey were taken by considering: "Necessary"; \"Not necessary, because\"; \"Not to be understood / Needs to be corrected / My suggestions\". Similarly, semi-structured focus group interviews lasted about 30 minutes were conducted with explainers in their science centers about questions that need to be added, the length and content of the survey and the like. By getting feedbacks from explainers, survey items were reexamined. At the end, some of them were rearranged, removed or added. To get feedbacks on the face and content validity of the survey, it was sent with the summary of the "BİLMER Project" to five academicians at different universities who are expert in survey development. Then, survey items were reviewed based on the feedbacks of academicians. After that, it was taken views of a linguist academician on the survey. Then, the survey was finalized. Thanks to data obtained from the surveys, the profiles of science explainers and their professional development needs will be revealed for the first time in Turkey.

Keywords: Explainer survey, Guide survey, Science center, BILMER project, BILMER explainer survey

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BIODIVERSITY IN MOROCCANS TEXTBOOKS: IMPLICATIONS FOR ACTION-ORIENTED ENVIRONMENTAL EDUCATION

Mustapha Arfaoui, Boujemaa Agorram, Salah-eddine Khzami, Sabah Selmaoui, Abdelaaziz Razouki

The world environmental situation is likely to be further aggravated by the increasingly rapid extinction of species. This is likely to destabilize various ecosystems. This phenomenon has stimulated citizenship's awareness to the extent that it is acknowledged that its study involves great educational value and should be present at school. Biodiversity teaching quality depends on how it is dealt with in the classroom. Given that textbooks constitute a widely used material, its content should increase the pupils' knowledge about Biodiversity and the consequencies of its loss. The present research explores the contents of school textbooks of Morocco in relation to Biodiversity topic. The research method is content analysis. The findings revealed that the majority of textbooks have integrated a number of issues that could enhance understanding about the significance of biodiversity but only one textbook dealt with consequences of its loss. The textbook analysis revealed a multiplicity of biodiversity definitions, with a strong predominance of the number of species, suggesting that many textbooks were outdated. Majority of analysed textbooks cannot expect concrete action planned and executed against loss of biodiversity. The paper calls for redressing some of the observed limitations through revision of existing content.

Keywords: Biodiversity, Content analysis, Textbooks, Environmental education.

BIOETHICS IN SCIENCE EDUCATION

Gülbin Özkan, Ünsal Umdu Topsakal

Recent developments in science will impact the practice of teachers who teach bioethics in schools. There is a growing awareness of bioethics issues amongst the public and in the media, and an increasing level of debate about them. It is important that teachers and those who teach biology are aware of the ethical and social implications of their work. This paper reviews and critiques the existing research on a bioethics, which deals with ethics in the context of science instruction. First, bioethics and bioethics issues are described. This is followed by an importance of bioethics education. Then the existing studies (on bioethics) are reviewed and evaluated. Because of the gaps with the existing research in the literature, recommendations are made describing the need for more and better designed research.

Keywords: Bioethics, Bioethical issues, Biotechnology, Science education

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BOTANICAL CLASSIFICATION AND BIODIVERSITY: WHAT RELATIONSHIP IN TEXTBOOKS OF MOROCCO

Lhoussaine Maskour, Anouar Alami, Boujemaa Agorram, Moncef Zaki

Biodiversity is rapidly declining worldwide. The main cause of the loss of biodiversity can be attributed to the influence of human beings on the world's. To protect biodiversity we need to understand it. An informed understanding of plant diversity and resources has never been more important. Environmental surveys and effective conservation strategies depend upon detailed knowledge of plants. To communicate such knowledge accurately and effectively, training is required in plant taxonomy, the discipline devoted to plant diversity, relationships and nomenclature. In Morocco, plant taxonomy is addressed in different levels of pimary and secondary education. Textbooks, didactical reference tool for pupils and teachers, also address this issue. The purpose of this paper is to present the results of the analysis of pedagogical approaches used by these textbooks. The methodology used is content analysis both in the text and in images. The analyzes show that there is dominance of the functionalist classification and negligence of the utility of species. In textbooks, there is use of ecological criteria, relating to reproductive and vegetative and negligence of genitical and biochemical criteria. The pedagogical styles are often informative and explanatory. The classification of plants is not linking in an explicit way with biodiversity. Results show that pedagogical approaches fail to develop the necessary skills to classify plants include in particular the kinship between species and to classify living species in their taxa. Such pedagogical approaches does not allow the development of critical thinking required in any action of the Environmentel Education.

Keywords: Botanical classification, Textbooks, Biodiversity, Pedagogical approachs

BRING COSMOS INTO THE CLASSROOM: 3D HOLOGRAM

Hasan Zühtü Okulu, Ayşe Oğuz Ünver

Three-dimensional structures of heavenly bodies and the fact that people make observations about universe only from their vantage point on Earth make difficult to understand astronomy concepts. Basic astronomy concepts such as shapes, sizes, distances and celestial motion contain spatial thinking ability. The students who lack spatial thinking ability have difficulties to constitute these concepts in their mind. Consequently, the necessity of using different learning environments and materials supported by technology is showed up. Beyond using available instructional materials, creating their own materials not only provides students with accessing to more knowledge through research but also fosters their thinking ability with variables. Concordantly, current study aims to give an artifact implementation example designed three-dimensional hologram mechanism with simple materials oriented teaching basic astronomy topics. Hologram mechanism consists of a truncated-pyramid shaped reflector made of transparent and hard material, a video about astronomy and a screen. The study group consists of volunteer prospective science teachers (N=15) in a Western Anatolian University. The research aim is not only to create permanent artifacts but also support prospective teachers' thinking and problem solving skills using mental processes. The activity is enabled to use participants' engineering and mathematic skills with designing hologram device and technologic tools via video making process. Implementations conducted with by six weekly workshops that each one takes about two hours. Participants created a permanent artifact with activity. Prospective teachers' astronomy interests were supported and their astronomy knowledge increased by the artifacts designed by them. Moreover, they have begun developing spatial thinking abilities with moving and three-dimensional model which assists them to perceive depth phenomenon in universe. They experience artifact design process at firsthand and find solutions to encountered problems. Participants learned how to create a three-dimensional model. Furthermore, the activity provides opportunity to use science, technology, engineering and mathematic related skills.

Keywords: Astronomy teaching, Artifacts, 3D hologram

CAUSAL SEM OF MATHEMATICAL COMPETENCES IN ELEMENTARY EDUCATION

Božidar Tepeš, Ivan Mrkonjić, Gordana Paić, Krunoslav Tepeš

In this paper, authors defined mathematical competences for 7th year elementary school. The basic objective was to measure the mathematical competence or mathematical knowledge, skills and abilities in mathematical educations. Mathematical competences were grouped in following areas: Algebra and functions, Space and shapes, Measurements and Data. Statistical set for the research consisted of 48 children from the Elementary school Dr. Ivan Merz in Zagreb, Croatia. Authors had 15 measuring variables together with the evaluated results of described tasks. With statistical set with variables as measured mathematical competences the authors make the causal structural equation model (SEM) of mathematical competences. The authors use free software Tetrad 5.2.1-3 (Tetrad project 2015). In the results we describe structural equations between the mathematical competitions for 7th year elementary school children. This paper is a result of our previous research on causal modeling of mathematical competences in kindergarten (Tepeš at. all. 2013, 2014 and 2015)

Keywords: Mathematical competences, Structural equation model, Causal model

CAUSAL SEM OF MATHEMATICAL COMPETENCES IN TEACHER EDUCATION

Božidar Tepeš, Marija Juričić Devčić, Maja Katarina Tomić, Krunoslav Tepeš

In this paper, authors defined mathematical competences in teacher education. The basic objective was to measure the mathematical competence or mathematical knowledge, skills and abilities in mathematical education. Mathematical competences were grouped in following areas: Basic mathematical competences, Arithmetic competences, Functions competences, Combinatory competences, Geometry competences. Statistical set for the research consisted of 80 students from the Faculty of Teacher Education, University of Zagreb, Croatia. Authors had 17 measuring variables together with the evaluated results of described tasks. With statistical set with variables as measured mathematical competences the authors make the causal structural equation model (SEM) of mathematical competences. The authors use free software Tetrad 5.2.1-3 (Tetrad project 2015). In the results we describe structural equations between the mathematical competitions for students in teacher education. This paper is a result of our previous research on causal modeling of mathematical competences in kindergarten (Tepeš at. all. 2013, 2014 and 2015) and in elementary education.

Keywords: Mathematical competences, Structural equation model, Causal model

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CHEMISTRY TEACHERS' UNDERSTANDING AND PRACTICES OF EQUITABLE ASSESSMENT

Kemal Izci

Teachers today more need to serve for all students than before because contemporary schools are different places than those people attend a few decades ago. Hence, providing equitable instruction is an important task for teachers. One of the dilemma teachers' faces in delivering equitable instruction is to uncover, assess and support diverse students learning (Fusco &Barton, 2001; Siegel, 2007). In order to assess and support diverse students' chemistry learning, chemistry teachers need to understand and use equitable assessment practices to provide equal opportunities for all students to engage in scientific practices to show their chemistry learning. Thus the current study aims to explore how chemistry teachers' understand equitable assessment and what ways they used to provide equity in their assessment practices. Four high school chemistry teachers who had a range of teaching experiences from one year to 24 years and were full time chemistry teachers at four different school districts in a Midwestern state of the USA participated in the study. Semi-structured interviews, observations, field notes, and artifacts were employed as data sources. All collected data qualitatively analyzed to illustrate participants' understanding and practices of equitable assessment. The teachers in this study mostly recognized the differences among individual learning styles and language proficiency as constructs that limit their students' equal engagement in their assessments that equitably demonstrate their learning. To reduce the influence of different learning styles and language proficiency, all teachers perceived that multiple assessment strategies should be used to let all students demonstrate their learning because they believed that as students learn differently, they should be assessed differently. The teachers also used some innovative ways including a) rephrasing or simplifying the language of assessment tasks, b) promoting peer learning and c) making students draw pictures to let all their students to equally show and enhance their learning.

Keywords: Equitable assessment, Chemistry teaching, Diverse student learning

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CHILDREN'S CONCEPT ABOUT SURFACE ORIENTATION OF LIQUIDS

Marija Bošnjak Stepanović, Milica Pavkov-hrvojević, Dušanka Obadović

The process of adopting the concept of horizontal position of the liquid surface by students of the third grade of elementary school is analysed in this paper. Numerous studies have found that approximately 40% of the adult population behave as if they do not know that liquid remains horizontal, regardless of the orientation of its container. If we asked students about position of the liquid surface, most will answer that liquid surface is always horizontal. However, checking a thorough understanding of this seemingly simple and widely known scientific fact, pointed to the difficulties. The sample consisted of students from six classes in elementary school "Ivo Lola Ribar" and "Dositej Obradovic" in Sombor (Serbia). In three of them, the project "Water is precious" is implemented, which lasted from March to June 2015. The paper presents the experiences and difficulties in adopting corect concept about surface orientation of liquids. Conclusions were drawn based on the study findings and offered possible solutions. The study has confirmed once again, that doing the one-time experiment, without continuity in observation and experimentation is insufficient to adopte properly and permanently certain scientific notions and concepts.

Keywords: Scientific concepts and notions, Basic properties of a liquid, Science in primary school teaching

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CITIZEN SCIENCE PROJECT NUCLEAR E-COLOGY; PHYSICAL RESULTS AND THE EDUCATIONAL IMPACT

Tadeusz Wibig, Punsiri Dam-o

We created citizen science project called "nuclear e-cology", and proposed it to high school teachers. Its main purpose was, in particular, to introduce the modern physics and science, in general, to afterhours school activities and eventually to modify high school curricula. We also put a special attention to the teamwork and the general scientific methods. Groups of students initially started the serious scientific work and some of them finished the study in the 2014/15 school year and we found results of their activity of the real physical value. We shortly present some of them here. We discuss here also some educational aspects of the project based on interviews and opinions of teacher involved in the project. We believe that the further work could be fruitful and successful from the point of view of students and teachers.

Keywords: Citizen science, Physics education, Heavy metal contamination, X-ray spectra

CLASSIFICATION OF THE QUESTIONS IN 8TH, 9TH AND 10TH GRADE MATHEMATICS TEXTBOOK WITH RESPECT TO THE COMPETENCY LEVELS OF PISA

Cenk Keşan, Yusuf Erkuş, Mehmet Çağlar Coşar, Deniz Kaya

Programme for International Student Assessment-PISA (Programme for International Student Assessment) is one of the world's most comprehensive educational research organized by Economic Cooperation and Development Organisation (Organisation for Economic Co-Operation and Development-OECD). The research made every three year in our country and in other participating OECD countries (approximately 90% of the world economy) evaluate 15 year old students' basic knowledge and skills they need to take their place in modern society. The content of the math textbook provides information on events and questions that deal with students in the classroom. So the level of the questions in the teacher guide books is impoertant to be examined in terms of the understanding of their impacts on student performance in PISA .In this study, document analysis methods were used. Document analysis involves the analysis of written materials containing information about the case or cases investigated (Yıldırım and Şimşek, 2005).The questions in textbooks are analyzed by three researchers based on 6 difficulty levels specified in PISA guidelines. The results of the study will be shared with researchers at the symposium.

Keywords: PISA, Mathematics competency levels, Mathematics textbook

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COHESIVENESS IN YOUNG CHILDREN'S MULTIMODAL SCIENCE REPRESENTATIONS: THE SEPARATE AND INTERACTING ROLES OF CONTENT AND ORGANIZATION OF THAT CONTENT

Deborah Linebarger, Ted Neal, Nathan Quarderer

Engaging in scientific exploration involves complex cognitive activities whereby young children engage with and puzzle over their everyday worlds. Although children need to develop knowledge about scientific concepts, recent efforts focus on children's abilities to use the practices of science to understand and investigate the natural world (e.g., ask questions, generate evidence, communicate knowledge). Evidence of a child's facility with these practices is evident in their manipulation of multiple modes of expression as they communicate their understanding of scientific phenomena. This project examined the effectiveness of an argument-based inquiry approach to science instruction with young children (~5 to 8 years old) who were assigned to classrooms using this approach (n = 176) or a traditional science instructional approach (n = 115). After finishing a unit, children were asked to compose an informative/explanatory document that represented their understanding of a science topic using text and pictorial modes of representation. These documents were scored for the number of unique text and picture ideas, the number of organizing text and picture features (e.g., emphasized text, labels, diagrams), and the degree of cohesiveness among the text and picture representations. Children in the argument group were more highly cohesive compared to the traditional group (Argument: 54.55% vs. Traditional: 26.96%). Path analyses indicated that the combination of unique text and picture ideas and the presentation of these ideas using a variety of organizing features accounted for more than half the variance in cohesiveness scores for children in the argument group. In contrast, only the number of unique text ideas was associated with cohesiveness for children in traditional science classrooms. These findings indicate that the facility to use and organize text and picture representations is important in science learning and validates how vital an argument-based approach is for helping young children learn and communicate science concepts.

Keywords: Multimodal, Science content, Early childhood, Organizing text features, Representational ability

COLLABORATION FOR CHANGE: A CASE STUDY OF A PHYSICS PROFESSOR

Will Stoll

This paper presents a phenomenographic case study of a senior physics professor during and beyond an extended collaboration with a science education professor from a College of Education. The context for the collaboration was the co-teaching of a physics course for graduate students in a Masters of Teaching program at a research university in the southeastern US. The course was focused on physics content and the pedagogy of teaching for conceptual change. The purpose of this study was to investigate from a physics professor's perspective the progression of his conceptions regarding teaching for conceptual change over the duration of the collaboration and beyond. Prior research indicated that such change is a difficult and complex process requiring a transformative, personal experience. Collaboration between science departments and Colleges of Education has been identified as a key opportunity for transformative experiences, but research on the resulting changes is limited. Questions addressed by this study include (a) what is the evidence of change in a physics professor's conceptions of teaching for conceptual change, (b) what are the learning environment characteristics identified by the physics professor that either facilitated or hindered changes in his conceptions in teaching for conceptual change. The primary data were interviews with the physics professor integrated with direct classroom observations. Emergent categories of how the physics professor conceived teaching for conceptual change showed a progression over time toward a more expert view on teaching for conceptual change. Key factors identified in the physics professor's progression are: 1) his motivation to become a more effective teacher, 2) the expertise of the science education professor, and 3) the way the collaboration developed. Limiting factors identified include: 1) time pressure for content coverage, 2) difficulty in translating change to other contexts, and 3) unsupportive external environments.

Keywords: Teaching for conceptual change, Physics education, Teacher change, Undergraduate STEM instruction

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COLLEGE STUDENTS' PERCEPTIONS OF LEARNING MATHEMATICS AND USING COMPUTERS

Tolga Gök

Mathematics is a key course to interpret the science and nature. A positive attitude should be improved by learners to comprehend the logic of mathematics. However, most of the students indicate that they are not interested in learning and studying mathematics, enhancing positive attitude towards mathematics, having confidence in learning mathematics, and having enough mathematics knowledge. Instead of understanding the basic principles, many students prefer to use sophisticated software packages or graphing calculators for solving mathematics problems. Thus, these tools prevent the improvement of their mathematical skills. This study investigates students' confidence when learning mathematics and using computers. Besides, the research examines the effects of computers and graphing calculators in the learning of mathematics on the students' opinions. The study was conducted with 230 technical vocational school students. The data of the research was collected using a survey of "Attitudes to Technology in Mathematics Learning Questionnaire". The results of the study indicated that many students are not interested in learning and understanding the subjects while studying mathematics on pen and paper worksheets. They prefer to solve mathematics problems with the help of sophisticated mathematics software packages or graphing calculators. Detailed results and recommendations based on the students' confidence and perceptions are presented in the study.

Keywords: Computer education, Confidence, Higher education, Mathematics education

COMPARISION OF GIFTED-TALENTED AND AVERAGE-ABILITY STUDENTS IN TERMS OF ATTITUDE TOWARDS STEM

Leyla Ayverdi, Yunus Emre Avcu, Özlem Karakoç

Developments on science and technology has make societies to revise their educational approaches and STEM education has emerged according to these changes. STEM is an integrated educational approach that Science, Technology, Engineering and Mathematics disciplines are being handle together. Purpose of this study is to compare attitudes toward STEM disciplines of gifted-talented and average-ability students and to determine any differences between groups in terms of gender and grade. Cross-sectional research design has been used in this research. Sample of the study constitutes 113 gifted-talented and 130 average-ability students from Balikesir-Karesi Province. Data was obtained by using STEM Attitude Scale developed by Faber, Unfried, Wiebe, Corn, Townsend ve Collins (2013) and adapted to Turkish by Yıldırım ve Selvi (2015). Data were analyzed by SPSS software version 20.0 and Mann Whitney U and Kruskal Wallis-H statistical tests were used during statistical analysis. There were statistically meaningful differences between gifted-talented students and average-ability students in terms of science, mathematics and total STEM scores. These differences were in favour of gifted and talented students. There were no statistically meaningful differences on engineering and 21st century skills scores. When differences between genders were examined, statistically meaningful differences on engineering scores in favour of boys and statistically meaningful differences on 21 st century skills in favour of girls was found. However no significant differences on science, mathematics and total STEM score was found. In comparison of grade levels, there were no significant differences between groups. When differences between groups were taken into account, it is considered that education for gifted and talented students should be improved in relation to engineering and 21 st century skills. At the same time, it can be suggested that education for both gifted-talented and average-ability students should be improved in terms of STEM disciplines.

Keywords: STEM education, Gifted-talented students.

COMPARISION OF MATH AND SCIENCE AND TECHNOLOGY SCORES IN TEOG AND SCHOOL SCORES

Özlem Görür, Mehmet Özaslan

Evaluation is one of the most important activity related to teaching process. Evaluation is the way of monitoring the effectiveness of the education system and determines the level of knowledge, skills and attitudes which are expected to acquire at the end of the assessment and evaluation, which has a basic function for taking much further. The aim of this study is to determine by comparing whether there is significant differences between Math and Science and Technology scores which are given by teachers or scores are received from TEOG. It was applied to descriptive survey model for trying to set an existing status. The universe of research was generated by the middle schools located in the district of İzmir (Buca) in the 2014-2015 academic year. Sample is including 1161 8th graders, are chosen from Buca via unbiased sample. Math and Science and Technology TEOG scores which were received by all of the students at the 8th grade and scores belonging to this class was used as the data source. For analysis of the data, t-test and one way analysis of variance was used for each independent group.It is used SPSS package program in the transfer and analysis of the statistical data on the computer. It was seen that the school scores, belonging to their 3rd exam at the second semester of 2014-2015 academic year, are higher than their

TEOG scores at the same semester. It was concluded that this may be originated because of the year end grades. It was developed recommendations result of this study, releaved that there is a significant difference between TEOG scores and school scores. Reasons of the difference among the scores can be searched by taking into consideration of importance of this exam for students and a fair grade system application can be provided for schools.

Keywords: TEOG, Exam, Student, Teacher

COMPARISON ALTERNATIVE ASSESSMENT METHODS USED IN TURKEY AND UNITED STATES ELEMENTARY 4TH GRADE MATHEMATICS: PROJECT BASED PERFORMANCE TASK

Mehmet Demir, Ugur Basbogaoglu, Cynthia A. Tananis, Keith W. Trahan

The research focuses specifically on alternative assessment methods in elementary mathematics because as in other disciplines, assessment in math is the primary factor in determining what students understand and do not understand as well as what and how they are learning (Adams and Hsu 1998). According to varied research in the literature (Pullu 2008; Bal 2009; Köklükaya 2010; Karakus 2010) as well as our research results, however, elementary teachers in Turkey are still using traditional methods such as multiple choice questions to assess students' progress in mathematics despite the change in Turkey's policy. These traditional assessment methods demonstrate basic mathematical knowledge but do not assess higher order-thinking (Dandis 2013). Therefore, our research was designed to examine the applicability of alternative assessment methods used in 4th grade mathematics courses in Turkey and in the U.S. in order to implement them more effectively and improving a new assessment proposal for Turkey. By applying Case Study in two specific countries, the researcher highlighted difficulties and barriers that the schools and the teachers confronted by observing and interviewing teachers about their opinions regarding the use of alternative assessment methods. Document examinations, semi-structured observations and semi-structured interviews were conducted to determine and compare the level of applicability of alternative assessment methods in 4th grade mathematics courses. It have been took into consideration the difficulties and barriers that were prevented the applicability of alternative assessment, the benefits of methods to students, parent and teachers profiles and their approaches to the assessment methods in Turkey. According to the Turkey and U.S. comparison of research findings, 'Project-Based Performance Task' has been developed for to reduce varied negativity to minimum, to provide multiple assessment opportunities, and to give students to gain 21st century skills.

Keywords: Mathematics, Alternative assessment, Project-based performance task

CONCEPTIONS OF PRE-SERVICE MATHEMATICS TEACHERS RELATED TO THE BASE CONCEPT

Tuğba Horzum, Erhan Ertekin

The purpose of this study was to determine pre-service teachers' conceptions related to the base concept via concept definitions and concept images. This study was conducted with 139 pre-service mathematics teachers studying at a state university in 1st and 2nd grade. The data were collected from two open-ended questions. Data obtained from the open-ended questions were analyzed using constant comparative analysis and they were visualized via the axial coding, which is a one of the coding technics of grounded theory. It was interpreted as a sign that the pre-service mathematics teachers referred the concept images for the concept definition because of being concept definitions almost the same as the concept images. Besides, it was found that pre-service mathematics teachers had the conceptions regarding the base concept based on the dominant image being touched the ground such as being a part/piece/place/side/segment/layer/edge which contacts the ground.

Keywords: Base, Concept definition, Concept image, Pre-service mathematics teachers

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CONCEPTUAL FRAMEWORKS OF SCIENCE STUDENT TEACHERS ABOUT GLOBAL ENVIRONMENTAL PROBLEMS

Osman Çardak, Musa Dikmenli

In the teaching programs and teacher education, whether the desired targets are achieved should be discussed despite the importance given to present environmental problems. The studies show that our country is not at the desired level in natural and environmental protection. In this regard, it is highly important for the science student teachers to determine the conceptual frameworks about the present environmental problems as the teachers to be. This is because the ideas of student teachers about the environmental problems will naturally influence the perspectives of students about the environment in their future professional life. The purpose of this research is to research the conceptual frameworks of science student teachers about the present environmental problems through the word association test technique. In line with this purpose, the science student teachers were given 10 key concepts and they made word associations for each concept. The key concepts were selected by the researchers by considering the contents of the environment lessons at undergraduate level. These concepts were ozone layer, acid rain, environmental pollution, erosion, global warming, pesticides, forest destruction, radiation, cancer, recycling. The answers given to the key concepts were analyzed with word association test technique. Interconcept hierarchical and non-hierarchical relations were shown by charts. While preparing the charts, 5-10 lower was taken as the break point from the number of most frequently made correct word connections for each key word. The results indicated that the conceptual frameworks of the science student teachers about the environmental problems were limited in some aspects. It was also found that the participants usually focussed on the traditional environmental problems instead of present environmental problems. The results were discussed with literature and suggestions were developed.

Keywords: Environmental pollution, Science education, Word association test.

CONTENT RECOMMENDATION SYSTEM BASED ON N-GRAM MODEL OF COLLABORATIVE FILTERING METHOD IN EDUCATION

Wonhui Yu, Heuiseok Lim

Recommendation systems are an important part of the e-commerce and online education system. They represent a powerful method for enabling users to filter through large information and product spaces. Nearly two decades of research on collaborative filtering have led to a varied set of algorithms and a rich collection of tools for evaluating their performance. Research in the field is moving in the direction of a richer understanding of how recommender technology may be embedded in specific domains. In particular, in the field of education difficult to apply the general big data model. The reason is that in many cases difficult to handle by the generalized student activity. In this paper, we propose a content recommendation system based on n-gram model of collaborative filtering method and considering these characteristics, and evaluate the proposed content recommendation system. The evaluation of the content recommendation system showed a 80% performance. In future studies, we will be precisely normalize the learner activity history, we will test the extent to improve performance by applying deep learning algorithms.

Keywords: Content recommendation system, N-gram, Collaborative filtering

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COORDINATION LEVEL AMONG THE CHEMISTRY TEACHING CURRICULUM OF PEDAGOGICAL UNIVERSITY AND GENERAL SECONDARY EDUCATION IN MOZAMBIQUE

Djabrú Manuel, António Madeira

The curriculum as an organized model of the educational program of the school and describing the matter, the method and teaching steps - what, how and when to teach, "is the assessment and analysis in the study: Coordination level among the Chemistry Teaching Curriculum of Pedagogical University and General Secondary Education in Mozambique. The initiated study serves as one of the main ways of and or curriculum and also predominant in the diagnosis of the level of learning and therefore the level of contents of program areas and class approval. It was established as a comparative study because Pedagogical University is the largest higher education institution in the country with the main mission to train education professionals. The main objective of the study is to know the levels of articulation between the teacher training curriculum of UP and General Secondary Education programs in chemistry subject. It focused on analysis of chemistry teaching curriculum of UP and chemistry teaching programs of the 8th to 12th of the national education system, and examination of the 12th from 2000 to 2010. The results prove the existence of gaps in the coordination of programs and major strategic gap between teaching and examination (time and given weight for each content). About research concluded that: 1- there is a lack of coordination between the ESG curricula and training of teachers (UP), thus creating a disparity in treatment considerations and content mode; 2- the introduction of new content or curriculum changes has not strictly followed the steps of the curriculum reform and not proceeded by training of teachers which hinders its implementation, treatment of certain content, providing poor learning, poor dispensing of the contents to examine, consequently the high level of failures. The survey results lead to suggestions for greater coordination in the preparation of curricula, defining priorities and above all avoid discrepancy in dosage of teaching time content with the weight of the exams.

Keywords: Curricula, Coordination, Training, Teaching and learning, Exams

CREATING AN ENGINEERING KNOWLEDGE BASE FOR STEM INTEGRATION: A MODIFIED DELPHI STUDY

Baki Cavlazoglu, Niyazi Erdogan

In this research study, we created a knowledge base for implementing earthquake engineering in science, technology, engineering, and mathematics (STEM) classrooms at high school level. New guidelines for K-12 STEM education stress STEM integration, connecting science, technology, mathematics, and engineering content among, rather than within individual domains. In this regard, some leading researchers have identified engineering as the likely catalyst for the integration. Therefore, STEM teachers have been encouraged to implement critical engineering content areas into their classrooms. However, research shows that many STEM teachers, particularly those traditionally prepared to teach within a specific content domain, need to enhance their knowledge in engineering content areas for successful implementation. Researchers have suggested that new integrated STEM curricula should contain a list of key concepts as a knowledge base for understanding the specific engineering content area. Therefore, there is a need for creating key concepts in critical engineering areas (e.g., earthquake engineering) enabling STEM teachers to successfully implement engineering into their classrooms. To create a knowledge base in earthquake engineering, we conducted a two-phase modified Delphi study to identify and verify a knowledge base for earthquake engineering at the high school level. In the first phase, three experts in STEM education participated in five panel meetings identified 37 key concepts in earthquake engineering. In the second phase, six experts in earthquake engineering verified 35 of the identified key concepts from the original list. High school STEM teachers can use these key concepts to understand and teach earthquake engineering content in their classrooms. Curriculum developers in STEM education can benefit from using key concepts in developing engineering integrated curricula. Finally, this modified Delphi study can be a research model for researchers to create knowledge bases in other engineering content areas.

Keywords: STEM education, STEM integration, Engineering education, Engineering knowledge base

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CREATING REAL LEARNING EXPERIENCES RATHER THAN TEACHING BASED ON THE TRADITIONAL TRANSFER OF MATHEMATICAL INFORMATION, AT COLLEGE LEVEL.

Elizabeth Mena Avilés, Ana Gema Guevara Aguilar, Ernesto Save Moreno, Roberto Rosas Rangel

Innovation in Education is a must in the 21st century education around the world. TEC de Monterrey in México as a system, is working hard in preparing and making their teachers innovate and use new educational models. Teachers are constantly implementing new teaching and learning techniques, not only to have better teaching practices in all fields, but to build life skills in their students. Competences such as collaborative work, problem solving, leadership and critical thinking are some of the skills that are cultivated through these techniques. A group of Mathematics´ teachers at Tec de Monterrey Campus León in Guanajuato México, have been using challenges in class as a way to create real learning experiences by using technology, flipped learning, mystery stories to improve reading comprehension skills and mathematical knowledge. Mathematics lessons have changed from simply transferring extensive amounts of information to creating the conditions for students to develop long life experiences. In a preliminary survey about math lessons in our campus, more than 54 % of the total students in this project, mentioned that they find math courses in general very hard, tedious, mechanical and without challenges. This study suggested that students learned math faster and deeply in a dynamic and fun way, 91 % of students in the final survey answered that learning math in this way was more meaningful and enjoyable, improving the enthusiasm about learning math among students. Math scores went up in the groups that followed this new educational technique.

Keywords: Learning experience, Dynamic, Innovation, Challenge

CREATING TECHNOLOGY-ENHANCED, LEARNER CENTERED CLASSROOM IN SCIENCE INSTRUCTION: PROVIDING FEEDBACK WITH USING MOBILE TECHNOLOGY

Özkan Yilmaz

"Learner centered" term points out environments that attention to the learners brings to the educational setting. This term includes teaching practices: effort to uncover what learners think in a specific problem on hand, talking about their misconceptions and, giving them situations to readjust their ideas. In Learner centered classrooms, teachers assess different student for feedback and revision. The two major, summative and formative, assessment reveal individual students' progress continually. Teachers, in many classrooms, provide feedbacks to students are relatively rare. Feedback is most effective in learning when students have the opportunity to use it to readjust their thinking. Technology integration, a part of learner centered classroom, is support to providing feedback in effective way. This paper explores the design of learner centered classroom in relation to the interactive technology integration which is based on using mobile technology to provide effective feedback in learning environment. Higher education students used mobile interactive technology with teacher, one term, in misconception in science course. Qualitative research design was used in this research. Focus group interview method was used to get data collecting. The study findings show that mobile technology supports feedback effectively and promote student engagement in the classroom

Keywords: Learner centered classroom, Feedback, Technology integration

CURRICULUM METAPHORS

Amr Ibrahim

One of the most common learning tools in the subject domain of education is metaphors. It has been said that learning is not possible without metaphors, let alone the usage of metaphors in our daily routine without even noticing. A lot of our common speech is full with metaphors that became a part of our normal dialogue, to the extent that we do not consider the "figure of speech" a metaphor any longer. More importantly, using metaphors to describe curriculum has been a method adopted by scholars trying to "practicalaise" curriculum and give it a living-like sense. Eventually, curriculum metaphors took a steep turn (in some cases) when it started navigating educational policies to undesirable areas of application. From that perspective, this paper will analyse the favorable / unfavorable effects of curriculum metaphors in general, with addition to an in-depth investigation of the appropriateness, the reliability and validity of notions of Production, Growth, and Journey as curriculum metaphors; explored in a short (but highly influential) article by Herbert Kliebard in 1972, and since, literature has been deliberating and confronting these three metaphors (among others like Medicine or Natural Resources) for their ability in characterizing curriculum.

Keywords: Education, Curriculum, Metaphors

CYBER SECURITY EDUCATION IN TURKEY

Mehmet Sevri, Nurettin Topaloğlu

Widespread use of technology have made information security and more specifically the security of critical infrastructure indispensable for countries. Thus, it is important to have well-trained cyber security experts and national software and systems that provide security for computer technologies. The importance of cyber security education becomes evident considering global and more recently local cyber attacks. Developed countries value the importance of cyber security and use different methods in educating their own security experts. With a newly developed consciousness for cyber security in Turkey, it is predicted that 20.000 experts are needed to work in this field. In Turkey, education of cyber security is generally provided by private sector. The most appropriate institutions for training qualified staff and enough experts to meet the country's needs are the universities. Although some universities in Turkey began education on cyber security in the last years, it is not sufficient. This paper examines the importance of cyber security education, Turkey's condition in cyber security education and developed countries' policies and methods for cyber security education.

Keywords: Cyber security, Information security, Education

DESIGN AND EVALUATION OF THE DYNAMIC MANIPULATIVE AND ACTIVITIES IN PROBABILITY EDUCATION

Tuba Ada, Selçuk Alkan

Manipulative is defined as controllable materials. The manipulatives are divided into two subgenres as dynamic and static manipulatives in the literature. Static manipulatives were only designed to read and to observe. However dynamic manipulatives are the materials with which users may interact (Spicer, 2000). The manipulative may also divided into two groups as virtual and concrete. Generally the materials which were designed with the computers are called virtual manipulatives (Durmuş and Karakırık, 2006 akt. Yaman and Şahin,2013). Virtual manipulatives are especially used in the education to teach the notions to the students. It may materialize the abstract notions by visualization that students have difficulty in understanding. Therefore students can learn these notions more easily. It also both enables to enrich problem solving activities and renders the class more attractive and efficient and it helps students to develop their creative thinking (Moyer, 2002). Akkan and Çakıcıoğlu (2009) have stated in their study -in which virtual and physical manipulatives are compared with each other- that students find virtual manipulatives more practical. At the same study it has been concluded that virtual manipulatives are not used in the class frequently. However using the physical materials in probability teaching is both difficult and expensive and it may lead to misconception. Therefore virtual manipulative can be used in probability subjects (Van De Walle,2012). At the each step of the probability education (in basic notion teaching, definition of the relation between theoretical and experimental probability, dependent and independent event teaching) virtual manipulatives can be used. In this context, this study aims to design manipulatives that will be used at the teaching of dependent event notion and to design appropriate activities with prepared manipulatives that are related to basic notions and to evaluate efficiency of these tools. The qualitative research pattern will be used in the study. The virtual manipulatives which will be used during the activity was developed by means of Unity 3d 5.0 version game engine. When the manipulative was being designed, it was benefited from the internet site of the American National Virtual Manipulative (unvl.com) Library. In addition, new activities were designed by benefitting from the activities that were developed by NCTM and MNE. These activities and manipulative 10 will be shown to the teacher and the interviews with teacher will be recorded. By this way the deficiencies and the point which are needed to correct will be determined.

Keywords: Virtual manipulative, Probability teaching

DETERMINATION OF NOS IDEAS BY MEANS OF PSEUDOSCIENTIFIC SCENARIOS

Mehpare Saka, Hikmet Sürmeli

The puropose of this study is to determine whether preservice science teachers distinguish science from pseudoscience and also whether they use their ideas about Nature of Science to make decisions in pseudoscientific contexts. In addition, whether they use different kinds of justifications were explored. The research sample consisted of 51 preservice science teachers in second year of Science Teacher Education Department at one university. The data was collected during the Spring semester of 2012-2013 academic year. Qualitative method was used for data collection and two scenarios were chosen for this study. While one is mostly unkown topic to students, other one is popular issue which is known by the preservice teachers. Each students asked to read both of the scenarios and answered the questions related with the scenarios. In addition students were asked to explain how they distinguish science from pseudoscience in an example. Qualitative data analysis was done by using content analysis including coding and creating themes related to students' responses to scenarios. Each scenario was analysed independently and general constructed categories were compared across scenarios. Data were analysed by two researchers seperately and created codes and categories were compares to find the similarities and differences. Data were in evaluation process, after finishing the analyzing, whether preservice science teachers use ideas of NOS to decide about socioscientific scenarios and justifications will be presented.

Keywords: Pseudoscience, Nature of science, Preservice teachers

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DETERMINATION OF SCIENCE STUDENT TEACHERS' VIEWS RELATED TO COMPUTER SUPPORTED INSTRUCTION

Hava Ipek Akbulut

The aim of the science and technology course is to ensure students to learn by doing. Students getting this course in a early age raises some problems like embody some abstract concepts, inability to observe some of the highlights. Computers are the one of the educational tools used in solving these problems in science teaching. Computers play an important role to concretize abstract concepts at a level students can understand, provision of animations in mind, doing the experiments which is difficult to observe in school environment, to repeat the experiments take time. Frequency of use of technology, science teachers, is closely related to be aware of technology and its benefits. How much knowledge they have acquired during his university years when they become teachers they will be more likely to use it. Therefore, to determine science student teachers knowledge and ideas on computer supported teaching and use of computer in science teaching, is expected to arrange training to eliminate misunderstandings and negative thoughts on using them. The aim of this study was to investigate science and technology student teachers views about computer supported teaching and its contribution to science and technology courses. The study was carried out with eighty two student teachers in Fatih Faculty of Education at Karadeniz Technical University in Trabzon. Data obtained from a questionnaire composed of two open-ended questions was analyzed by using content analysis. Student teacher views are coded and in order to reflect prospective teachers opinions direct quotations were used. It has seen that prospective teachers defined computer supported materials as execution tool for courses, providing for effective teaching that appeals to the senses, supporting tool for teaching, a technique that facilitates education, a tool to prevent loss of time, teaching material. Prospective teachers views about contribution of computer to science and technology are to provide permanent learning, secure experiment doing tool, presentation tool, a method used to ensure effective teaching, a tool provides visuality and student participation, used to embody abstract concepts, used to increase students interest to courses, facilitates learning, draw attention

Keywords: Science student teacher, Computer supported teaching

DETERMINATION OF THE DIFFERENCES BETWEEN PRESERVICE TEACHERS' AND PEDAGOGICAL FORMATION STUDENTS' SELF EFFICACY AND PERSPECTIVES TO TEACHING PROFESSION

Gülfem Muşlu Kaygisiz, Hikmet Sürmeli

The purpose of this study is to find self efficacy and teaching profession perspectives of preservice teachers' and pedagogical formation students' based on various variables. In this study it was examined that whether preservice teachers' and students' from different disciplines efficacy change in terms of their disciplines. In addition, it was also searched whether their perspective on teaching show any changes in terms of their disciplines. The data was collected from two different universities in spring semester of 2015-2016 academic year in Turkey. Preservice teachers in four year teacher prepation programme and students graduated from different disciplines and attended in one year pedagogical formation programmes in educational faculty were attended in this study. Data related to self efficacy was collected through Teachers' Sense of Efficacy Scale developed by Çapa, Çakıroğlu and Sarıkaya (2005). Data related to teaching profession of preservice teachers and students from different disciplines was collected by openended questions. While open ended questions were analysed by using qualitative analysis method including content analysis, responses gathered from the scale was analysed by using quantitative analysis. Statistically analysis of the data including descriptive statistics and t test for independent groups was carried out by means of SPSS 17.00 program. The findings and results of this study is under evolution process which aims to display the participants' sense of self efficacy and perceptions and teaching profession.

Keywords: Teaching profession, Self efficacy, Preservice teachers, Pedagogical formation students

DETERMINATION OF THE EMOTIONAL INTELLIGENCE OF CANDIDATE TEACHERS STARTED DIFFERENT DEPARTMENT

Bircan Ünlü, Ebru Ezberci Çevik, Mehmet Altan Kurnaz

Candidate teachers who studying in education faculty which trained future teachers, have individual differences, encounter with many case/problem and hence emotional intelligence plays an important role to cope with them. The aim of this study is to reveal the relationship between emotional intelligence and graduated high school and economic level of candidate teachers who studied in different programs (science education, elementary mathematics teaching, classroom teaching, social studies teaching, pre-school teaching, computer and instructional technology teaching). Survey method carried out by the method in this research. The working group consists a total of 484 candidate teachers who were studying in 1th class of different department of a university in the western Black Sea region in the fall semester 2015-2016 academic year: 87 from science, 57 from elementary mathematics, 105 classroom, 74 social studies, 132 pre-school, 29 computer and instructional technology. Schutte Emotional Intelligence Scale was used for the data collection tool. The scale is a three-factor scale (Optimism/Mood Regulation, Utilisation of Emotions, Appraisal and Expression of Emotions) with 5-point likert type. SPSS 22 was used to analyze data and was benefited two factor variance analysis. As a result, seperately it was found that the interplay between the programs candidate teachers are enrolled in*graduated high school was not significant in predicting optimism, utilisation of emotions, appraisal and expression of emotions and emotional intelligence (p>0,05). Besides, it was determined that the interplay between the programs candidate teachers are enrolled in*economic level was not significant in predicting optimism, utilisation of emotions, appraisal and expression of emotions and emotional intelligence (p>0,05). It is suggested that different researches can be done about emotional intelligence in the subject field according to different perspectives and/or different variables during training candidate teachers.

Keywords: Emotional intelligence, Candidate teachers, Programme, Economic level, Graduated high school

DETERMINATION OF THE SCIENCE TEACHER CANDIDATES' UNDERSTANDING LEVEL OF SCIENCE PROCESS SKILLS: EXAMPLE OF THE STRENGTH OF THE ELECTROMAGNET

Gonca Harman, Aytekin Çökelez

It is extremely important and necessary to gain the skills as identifying variables, establishing hypothesis, changing and controlling variables. Because, individuals solve problems in daily life by using the science process skills and testing their hypothesis. Therefore, this study aims to determine last year science teacher candidates' understanding level of science process skills. For this purpose, teacher candidates have been asked to solve problem about "What are factor/factors that effect the strength of the electromagnet?" by determining variables, establishing hypotheses, changing and controlling variables. The study group consisted of a total of 90 last year science teacher candidates attending the Department of Science Teaching of a Faculty of Education. General screening model has been used in this study. The data obtained from this study have been analysed using descriptive analysis. More than half of the science teacher candidates expressed that when the number of coil is kept fixed, but the number of battery is increased, the strength of the electromagnet is increased. When the number of battery is kept fixed, but the number of coil is increased, the strength of the electromagnet is increased. The results of this study showed that some of the teacher candidates have been used interchangeably independent, controlled and dependent variable types. According to the results, some of the science teacher candidates expressed that temperature, the distance between material and electromagnets, the type, length and thickness of the nails, the type and mass of the matter effect on the strength of the electromagnet.

Keywords: Science process skills, Science teacher candidate.

DETERMINING AND COMPARING THE SCIENCE PROCESS SKILL LEVELS OF 5TH AND 8TH GRADE STUDENTS

Jale Kalemkuş, Şule Bayraktar, Fatih Kalemkuş

The aims of this study are to determine and compare the levels of scientific process skills of 5th and 8th grade students. The skills which were examined specifically for this research are as following: Observation, classification, measurement, recording data, establishing space and number relationships, predicting, identifying variables, interpreting data, inference, hypothesizing, modelling, and experimenting. Research was conducted with a total of 200 students, 100 students at 5th grade and 100 students at 8th grade, attending to a middle school in the province of Kars. In this research the survey method was utilized. Science Process Skills Test (SPST) consisting of multiple choice questions administered to students of each grades to determine their level of science process skills. Data was examined by utilizing frequency and percentage distributions. The findings show that skill level of the 8th grade students is higher than the 5th grade students. In addition, both 5th graders and 8th graders' performance level for experimenting and establishing space and number relationships are lower compared to other process skills. Findings also showed that 5th grade students are better in recording data, and 8th graders are better in creating a model in compare to other science process skills.

Keywords: Science process skills, Middle school, Science teaching

DETERMINING SCIENCE TEACHER CANDIDATES' OPINIONS RELATED TO "HEAT TRANSMISSION BY CONVECTION"

Tülay Şenel Çoruhlu, Işik Saliha Karal Eyüboğlu

The aim of this study was to determine opinions of Science teacher candidates related to "Heat transmission by convection". Cross sectional method, a kind of developmental research was used in the study. The sample of the study consisted of 211 science teacher candidates at Karadeniz Technical University Fatih Faculty of Education (1st grade N=55; 2nd grade N=50; 3rd grade N=56; 4th grade N= 50). A conceptual understanding test and a semi-structured interview question were used in data collection process. The test and semi structured questions were developed by the researcher. Teacher candidates were asked three open-ended questions in the test. Two different daily life events were given to teacher candidates in the first and second questions to answer. In the third question "How is heat transmitted by convection? (Think and draw the particular structure of matter)" was asked to teacher candidates. At the end of the study; it was found that teacher candidates had problems in explaining and showing heat transmission by convection at particle scale. Also teacher candidates confused heat transmission ways, convection and conduction, with each other, so the majority of the teacher candidates had misconceptions.

Keywords: Science teacher candidates, Developmental research, Convection

DETERMINING THE MENTAL MODELS OF THE 6TH GRADE STUDENTS ABOUT THE SUBJECT OF "PHYSICAL AND CHEMICAL CHANGES"

Hasene Esra Yildirir, Hatice Demirkol

Mental models are the individual mental representations which are produced as a result of cognitive processes by the individuals (Güneş et.al., 2004). This study aims to determine the mental models of the 6th grade students about the subject of "Physical and Chemical Changes" and reveal any misconceptions about this subject. The sampling of the study is constituted by the 157 6th grade students who are studying at 8 secondary schools in Kütahya province Domaniç district. An open ended test with 7 questions was developed by the researches so as to determine the mental models of the students about the subject of "Physical and Chemical Changes". The data which was obtained from the test was analysed by using a fivefold level determining scale (Karagöz & Sağlam Arslan, 2012) in order to reveal the overall success statuses of the students. Moreover, the answers which were given by the students in the test were analysed to determine their mental models and misconceptions about the physical and chemical changes. As a result of the analyses, it was determined that the majority of the answers of the students were at level 1 ("answers in conformity with scientific knowledge") and level 3 ("missing answers in conformity with scientific knowledge"). Besides that, it was also found that the students could not show the physical and chemical changes that occur in the substances in the particulate size, they had problems in defining the change in an event, they decided depending on whether the event is recycling or not while defining the change and they thought the changes in the substance in macro size also occurred in the micro size.

Keywords: Mental models, Physical and chemical changes, 6th grade student

DETERMINING THE VIEWPOINTS OF MATHS TEACHERS ON ROTATING CLASS SYSTEM (ORDU PROVINCE CASE)

Oğuz Balci, Yunus Pinarkaya, Gökhan Özsoy, Cengiz Özyürek

In the Mathematics curriculum which has been used since 2013 in Turkey, instead of transferring the knowledge, the teachers should include guiding activities for students during the classes. In order to carry out these activities in a proper way, it is necessary to create educational environment where students can understand these activities. In the studies carried out, a big majority of maths teachers support the idea that maths classes should be carried out in specially designed classrooms for maths. The purpose of this study is to identify the opinions of secondary school maths teachers on rotating class system. To do that, the "Teacher Questionnaire on Rotating Class System" developed by Ersöz was revised and administered to maths teachers. The sample group of the study was maths teachers working at 10 official secondary schools of the Ministry of National Education at Ordu province during 2014-2015 academic year. All the maths teachers working at the aforementioned secondary schools were accessed and the questionnaire was administered on a total number of 41 maths teachers. And since the data in this study didn't have a normal distribution, nonparametric tests were used in the analyses. The analyses were conducted using SPSS 16.0 package programme. Whether there was a significant difference in teachers' opinions on rotating class system based on gender, seniority in the profession and whether they worked on a school where this system was used was analysed. The results of the study indicated that maths teachers wanted a maths classroom for themselves in the school and that these classrooms would motivate them. In addition, teachers stated that courses taught in maths classrooms would increase students' interest in the course, decrease the wear out of the materials that is caused by carrying the materials from one class to another and that the courses would be more productive.

Keywords: Rotating class system, Education, Maths

DEVELOPING AND IMPLEMENTING AN EPORTFOLIO

Sally De-vitry Smith, Lisa Charmer, Angela Manuel

A program leading to registration as a health professional is required to meet the clinical requirements for accreditation. Students in diverse health professions including medicine, dentistry, physiotherapy, nursing, midwifery, occupational therapy, radiography and ultrasound are required to document clinical skills. Each skill must be documented and securely signed by a suitably qualified health professional. Universities must ensure they have adequate systems in place to monitor and verify each student's achievement of required clinical practice experiences. Traditionally documentation of clinical experiences has required large workbooks students have to carry with them. Students are anxious about losing any of their clinical documentation as it influences their ability to graduate. Students have been known to prioritise their workbook when leaving a burning building or after a car accident! The eportfolio is the way of the future and can be used to assess a student's professional and personal development as well as documenting clinical skills. The eportfolio can continue to be used after graduation and registration to document professional development. Charles Sturt University has developed an eportfolio to replace the paper based workbook and diary used to record clinical experiences. A research project is currently underway evaluating the experience of students and clinical supervisors in various formats. Students and their facilitators will be able to access the eportfolio 24 hours a day with a computer or mobile device. Clinical experiences can be documented and signed using a computer, ipad or mobile phone. Students can submit work to their university electronically and receive instantaneous feedback. Developing an eportfolio saves time and money as clinical sites do not have to learn multiple different paper based systems. It is envisaged the eportfolio platform can be developed for use by the majority of universities. This presentation outlines Charles Sturt University's experience designing and implementing an eportfolio.

Keywords: Clinical experience, Documentation, Electronic portfolio

DEVELOPMENT OF A VALID AND RELIABLE ACHIEVEMENT TEST IN THE UNIT OF FORCE AND MOVEMENT

Şahin Idin, Cemil Aydoğdu

The aim of this study is to develop a valid and relaible achievement test that is about Force and Movement unit within the 7th grade level. That unit has 31 acquisitions. There has been prepared totaly 62 questions to correspond every acquisitions. Firstly two measurement and evaulate expert examined and then a science education speacilist examined the achiement test. After that necessary corrections have been made. It was applied to 25 7th grade pupils before it was used. The feedbacks were considered which came from pupils and necesarry corrections was made. Finally achiement test was prepared. Then it was applied to 270 pupils who were 8th grade and had seen the issues before it's implementation. It's Cronbach alpha reliable coefficient was found 0.804. The item analysis statistics resulted in the item difficulty index of 0.309 and the discrimination index of 0.367.

Keywords: Achievement test, Force and movement, Reliability, Validity

DEVELOPMENT OF SCIENTIST IMAGE SCALE FOR PRE-SERVICE TEACHERS: THE VALIDITY AND RELIABILITY STUDY

Mustafa Metin, Şeyma Ulukök Yildirim

The aim of study is to develop a scale to uncover Pre-service teachers' scientist image. In order to develop a scale, the study was conducted with a sample of 228 Pre-service teachers' different department such as Primary, Science, Mathematics and pre-school Teacher Education. The study consists of literature review, item pool, experts' opinions, administration of scale and computing the reliability and validity. While constituting the pool of items, so many scales towards students, pre-service teachers and teachers' image of scientist were examined in order to determine the statements of the scale and how to develop a scale by researches. Besides, twenty pre-service teachers in different department draw a pictures regarding scientist image. After review of literature and drawing pictures, the draft scale consists of 58 items was developed. These items were edited to 50 by the opinion of the experts and the five point likert type draft such as "strongly disagree", "disagree", "undecided", "agree" and "strongly agree". Final draft of the scale with 50 items was administered to 228 pre-service teachers for calculating validity (particularly construct validity) and reliability of the attitude scale. The data collected from pre-service teachers were analyzed by means of factor analysis and reliability analysis through the use of SPSS. Firstly, an assessment of the normality of data is used shapiro-wilk test. According to result, the scale has normal distribution (p>0.05). Secondly for the validity of the scale, the data were subjected to factor analysis with principle component method in order to examine the factor structure behind the scale. After scale was administered to pre-service teachers, the suitability of the current data for factor analysis was checked with the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Barlett's test. KMO values of .60 or above are acceptable. In this scale, the KMO value of the initial analysis was .825.The Bartlett's Test of Sphericity reached a significant value supporting the factorability of the correlation matrix obtained from the items [Approx. Chi-Square: 3257.357 (p< 0.01)]. According to results Barlett's test of Spherincity statistic was significant. After determining this result, the principal components factor analysis was followed by varimax rotation (rotated component matrix). I thought that the variance explained by one factor that would be independent of the variance in the other factors. The exploratory factor analysis was administered the 50

items. The Principle components factor analysis was used for all the data in order to extract the appropriate number of factors. The initial solution revealed that four factors had an eigenvalue greater than1.These factors altogether explained 42.2% of variance of results. Overall, factors were represented just by one item per each factor with loading higher than 0.4. Thus remaining one factor was considered not interpretable. Six items were deleted because their factor loadings were lower than 0.4). Six out of 44 attitude items were deleted and the factor analysis for rotation was run again over the data set with 38 items. Then, Varimax rotation was used. After using varimax rotation, the factor loadings for each item were examined. Loadings of less than 0.40, a commonly-used cut-off, were eliminated. Thus, the factor analysis resulted in four independent factors with factor loadings greater than 0.4. The factor loading of items in the scale changes between 0.402 and 0.727. This situation indicated that 38 of item are enough qualified in the scale. Finally, reliability analysis was performed for each of the emerged sub-scales and Cronbach alpha correlation coefficients were used. Then, Cronbach alpha correlation coefficients were calculated among these factors. İt was determined that Cronbach alpha value of the four factors between 0.82 and 0.88. Also, it was found that Cronbach alpha value of total scale is 0.870. According to these results, it can be said that scientist image scale is a valuable and reliable scale.

Keywords: Scientist image scale, Pre-service teachers

DEVELOPMENT OF THE SECONDARY-BIOLOGY CONCEPT INVENTORY (S-BCI)

Andria Stammen, Deborah Lan, Anita Schuchaerdt, Kathy Malone, Lin Ding, Dr. Zakee Sabree, Dr. William Boone

This project aims to develop a measurement tool for assessing the conceptual understanding of secondary grade-level biology students (grades 7 to 12) that is reliable and valid. Currently, there is no such assessment that has been developed for secondary students. The study reported here describes the validity assessment of S-BCI. A pool of assessment tasks were designed to target major biology constructs. The assessment items answer stems were developed to include distractors representing students' alternative conceptions obtained from literature and student interviews. The validation stage of the S-BCI development involved an iterative revision and review process to help establish sufficient S-BCI content and construct validity. This stage included (i) student interviews and (ii) multi-expert panel critique. Based on the results of the aforementioned analyses, assessment items proven to be valid where included on the S-BCI.

Keywords: Biology, Secondary education, Concept inventory, Alternative conceptions

DIFFUSION OF M-LEARNING: SAKARYA UNIVERSITY CASE

Naciye Güliz Uğur, Tuğba Koç

Mobile learning (m-learning) is considered as the next generation of e-learning using mobile technologies to facilitate education for teaching and learning purposes, anywhere and anytime. This paper analyzes seventy college students selected randomly from a state university in predicting their acceptance attributes based upon Diffusion of Innovation (DOI) framework towards using the m-learning. The objectives of this research are to determine the level of usage of mobile learning and to identify the factors that the learners' intentions to adopt are of relative advantage, compatibility, complexity, observability, and trialability. The research uses standard instrument to capture students' responses on the five basic constructs of DOI model that includes relative advantage, compatibility, complexity, observability and trialability. The data is analyzed through Smart-PLS. The PLS allows the researcher to test the relationship within the measures and the hypothesized relationships between the measures simultaneously. The findings indicate that the relative advantage and compatibility are the significant determinants of the adoption of m-learning technology. The explanatory power of model indicates that 42% of the total variance towards adoption intention is explained showing the moderate parsimony of the model. Based upon the conclusion, some pedagogical recommendations are made for the relevant authorities.

Keywords: m-learning, College students, Diffusion of innovation (DOI), Sakarya University

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DIGITAL LOGIC DESIGN TEACHING MODULE DESIGN FOR BASIC BOOLEAN OPERATIONS

Kamil Yurtkan

Digital Logic Design is a compulsory course for most of the Electrical and Electronic and Computer Engineering departments. It includes the introduction to Boolean Algebra and basic logic operations which are NOT, AND and OR operations. The aim of this study is to design and develop a teaching module to be used in teaching and tutoring introductory digital logic design with basic operations. The basic analysis tools that are logic diagrams, timing diagrams and truth tables are to be involved in the module. Boolean functions, their representation and simplification are also in the scope of the module. Algebraic manipulations including the basic Boolean operations which are based on the rules of the Boolean Algebra is to It is aimed to be beneficial for both students and teachers in order to assist the teaching activities. It is aimed to be used as a standalone module as well as the supporting module for the teachers. The module is to be developed by using MATLAB program as it provides easy access with limited resources to students, teachers and educational institutions. Digital Logic Design course is in the curriculum of Electrical and Electronic Engineering, Computer Engineering, Information Systems Engineering and Computer Programming departments of Cyprus International University. The teaching module will be applied and tested in these departments for teaching and tutoring.

Keywords: Digital logic design, Logic gates, Teaching module, Boolean algebra, And operation, Or operation, Not operation.

DISCOVERING RELATION BETWEEN PYTHAGORAS RELATIONSHIP AND THE GRANDI'S ROSES WITH A DYNAMIC GEOMETRY SOFTWARE

Recep Aslaner, Kübra Açıkgül

In the second half of the 20th century new technologies were emerged rapidly. Mathematics education was also affected by this change like other education areas. When it comes to technolojies used in mathematics education, one of the most conceivable ones is Dynamic Geometry Softwares such as Cabri, Cinderella, Geogebra. Dynamic Geometry Softwares has the important potential to teach and learn geometry subjects. One of the subjects is locus. It is taught that Dynamic Geometry Softwares are highly effective in the process of solving locus problems. The dynamic geometry softwares's "Trace", "Animation" and "Locus" features offer new possibilities for solving locus problems. In traditional learning processes including use of paper, pencil, ruler, solving locus problems is very hard. Contrary to application process used paper,pencil, ruler in the process of the software solution, students get opportunity to discover mathematical associations by recognizing invariant features in addition to variant features by the help of the software's drag and feedback features. Snapshot impressions can be easily done with these softwares. In this study, it is presented a locus activity using Dynamic Geometry Software. In activity, Dynamic Geometry Softwareoffer the opportunity to create curves called as Grandi's roses using the Pythagorean relationship and open the way for the generalization.

Keywords: Pythagorean relationship, Rose curves, Locus, Dynamic Geometry Software

DOES SHADOW EDUCATION AGGRAVATE INEQUALITY OF EDUCATIONAL OUTCOMES

Yongmei Hu, Wenfeng Fan, Weili Ding

The "shadow education" system of private supplementary tutoring has become quite common in East Asian countries nowadays. Based on the data of Programme for International Student Assessment 2012 (PISA 2012), the paper analyzes the influence of shadow education on the mathematical literacy of students of Shanghai, Hong Kong, Japan and Korea by means of a hierarchical linear model, and estimates the net effect of shadow education using the method of reweighting on propensity score matching (RPSM). The following findings are obtained from the study: First, supplementary math tutoring has a significant positive effect on the math score of students, and such an effect is more obvious on Japanese and Korean students than on Hong Kong and Shanghai students; second, supplementary math tutoring and supplementary science tutoring complement each other; and third, attending supplementary math tutoring may narrow the gap between students in learning performance that is caused by the difference in their families' economic, social and cultural status (ESCS), thus promoting the equality of educational outcomes. Therefore, governments and schools are advised to provide necessary opportunities of supplementary tutoring for low-capacity students from low-income families and waive their tuition fees; large-sized extracurricular education groups should be encouraged to establish after-school learning funds and/or incentive funds for students from poor families and grant fee remissions to those from ultra-low income families, so as to create a situation where the government, the school and the society jointly promote the equality of educational outcomes in the stage of compulsory education.

Keywords: Shadow education, Inequality of educational outcomes, PISA, RPSM

DRAMA FOR INCLUSION IN SCIENCE

John Oversby

Engaging young learners, and helping them to appreciate the Nature of Science, is a challenge for many teachers. This paper provides an example that integrates history of chemistry, historical contexts, history of science discovery, and philosophical ideas, set in the form of a play based in the late 18th century in the laboratory of Antoine and Marie Lavoisier. It takes the perspective of one of Lavoisier's artisans, a carpenter, and his friend, a stonemason, to illustrate the point that scientific discovery is not the sole work of the scientists involved. A point about inclusion is so made. The paper also provides pedagogical support, as recommendations, to ensure that all of the young learners become involved. The research has a number of bases, from the evidence of historical scientific development, the historical social contenxt, and the Nature of Science (philosophy, and evidence about the roles of drama in science, to create an innovative pedagogical tool for use in the classroom concerning elemensts of social justice. The paper concludes with suggestions for furher research, and implications for engagement and motivation.

Keywords: Drama, Inclusion, History, Philosophy, Science

EFFECT OF DIFFERENT TECHNOLOGY EDUCATIONAL TAKEN TEACHERS AND NUMBER OF THIS EDUCATIONAL TO PERCEPTIONS OF TEACHERS' TECHNOLOGICAL PEDAGOGICAL KNOWLEGDE, TO PERCEPTION OF TOWARDS ACCESS TECHNOLOGICAL INSTRUMENTS AND TO PERCEPTION OF SUPPORT TOWARDS USING

Özhan Karaca, Ilhan Varank

In this study, investigate in service technological educational with and without teachers to different variables(Perceptions of Technological Pedagogical Knowledge, Perception Towards the Use of Technology and Perceptions Towards Technological Instruments to Access) whether significant differences between perceptions. Research questions is formed technological-pedagogical knowledge perceptions, perceptions regarding the use of technology and teachers receive support on the use of technology and encountered barriers with related according to teachers taken different technological education (Fatih Project Technology Education, General Technology Education and Their Self-study) whether significant differences between perceptions of teachers and according to number of teachers taken different technological education [taken 1,2 or 3 training (Fatih Project Technology Education, General Technology Education and Their Self-study)] technological-pedagogical knowledge perceptions, perceptions regarding the use of technology and teachers receive support on the use of technology and encountered barriers with related whether significant differences between perceptions of teachers. Working group is formed (297) branch teachers who in service technological educational with and without teachers 2014-2015 academic year of working in middle schools and high schools in Konya. In this study, data were collected through questionnaires and survey, "personal information" and "Questionnaire" is made up of parts. Personal information is formed gender, age, graduation, length of service, branch, types of schools made the task, the use of technology level, access status to the technology needed in schools, the case of teacher training about technological information. The part of survey is formed 4Likert-type(Absolutely I agree, I agree, I disagree, strongly disagree) 40 questions which using teachers' perceptions of technology, pedagogical beliefs, technological beliefs, teachers receive among support on the use of technology and encountered barriers to determine how a relationship. Alpha reliability coefficient was calculated for each a scale on item of scale and on the overall survey scores is made the Shapiro-Wilk normality tests. None of the scale total score was normally distributed.

Keywords: Technology education, In-service training, Technological pedagogical perception, Use of technology, Integration

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EFFECT OF TEACHERS' PROFESSIONAL DEVELOPMENT FROM MATHFORWARD™ ON STUDENTS' MATH ACHIEVEMENT

Kristina Hill, Ali Bicer, Robert Capraro

MathForward™, developed in 2004-2005 in cooperation with the Richardson (TX) Independent School District, was implemented nationwide in 2007. The program integrates TI technology and professional development while focusing on student achievement and teacher efficacy. This study investigated the effect of the MathForward™ program on student achievement scores of Algebra I students from a southeast Texas high school. The specific purpose of this study was to understand whether there was an effect on students' STARR mathematics scores, accounting for teacher professional development and years of experience. To do this, structural equation modeling (SEM) in M-plus was employed. The result of the present study showed that our model fits well to the data and the explained variance of students' mathematics achievement (R^2 = .14).

Keywords: Professional development, Technology, Mathematics achievement

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EFFECT OF THE MEDIA FOR CHOOSING THE DEPARTMENT OF BIOLOGY EDUCATION AND TEACHERS CANDIDATES' ACADEMIC ACHIEVEMENT

Tahir Atici

The purpose of this research are expected to provide insight about whether the current student selecting system is fit for purpose or not by investigating the motives of the biology teacher candidates on selecting this branch and the influence of these motives on the candidates' academic achievements. The increase in the significance of the science of biology and the importance of learning biology means there is an increase in the significance of biology teachers as well. A science so significant for humanity being taught by teachers who are uninterested and untalented in this field is unacceptable. In this sense, there is apparently a necessity of raising teachers committed to the profession, conscious and successful in the academic field. The objectives of this research are to put forth the biology teacher candidates' motives for selecting this branch and to detect the effects of these motives on the candidates' success levels. It will also be examined if the teacher candidates' motives for selecting the branch and their academic success levels differentiate significantly depending on their gender. In this research, the quantitative data has been collected, analyzed and consequently the gathered data has been obtained. The research was implemented directly and carried out with the biology teacher candidates who are 2nd, 3rd and 4th grade (N=66) in the Spring Semester of 2010-2011 education year. In order to evaluate the data t test for independent groups and Pearson correlation coefficient r have been implemented and SPSS software for Windows has been used. Findings indicated that the two main reasons why the biology teacher candidates select this branch are respectively, the fact that their scores on the student selection exam were insufficient for attending the fields they desired (media effect) and secondly their passion about the profession of teaching and biology. The number of female biology teacher candidates and their academic success levels surpass those of males. No link between the motives of the candidates for selecting the branch and their academic success levels has been found. At the end of the research, relevant advice has been given about directing the students to the field more properly and about the potential studies that might be conducted in the field. Biology teachers and biology teacher candidates were asked the reasons for choosing the biology teacher department of the response to the "biological liking has been". This is

30.6% of the teachers who responded, 27.1% was determined as the ratio of teacher candidates. This, 27.1% for teachers with a ratio of "likes-worry", 11.4% for teachers with a ratio of "interest-Wonder" and "Chance" followed. Biology teaching, and the teaching of biology teachers who prefer to love both of them, the ratio was 4.1%, while only 2.6% for the candidates who remain in. Only 5% of the teachers who chose this profession for the love of teaching with the teacher candidates 9.5% accounted for. Biology teacher jobs in the best part of the teachers' advice, or any candidate who would prefer not to consider. Teacher candidates' levels of academic achievement were no significant differences between the genders. More than half of teachers' section of Biology showed that the first five preferences. A large number of teachers graduating from university science faculties of biology, because they are similar to the studies done on the biology students of these faculties will reveal useful results.

Keywords: Biology education, Academic achievement, Media effect, Teacher candidate

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EFFECTS OF AFFECTIVE CHARACTERISTICS ON MATHEMATICS PERFORMANCE OF PISA 2012 IN KOREA AND USA: QUANTITATIVE ANALYSIS AND SUGGESTIONS

Seohee Park, Yejun Bae

Quantitative analysis of PISA 2012 Math Data was conducted focusing on finding factors that engender the significant differences in the affective variables between Korea (n=754) and USA (n=852). The types of behaviors for self-beliefs and motivation which are the remarkable factors to generate differences in two countries are deeply examined in this study. The purpose of this study is to distinguish effects of the affective characteristics on the mathematics performance in Korea and USA based on PISA 2012 result. Descriptive statistics provides the answer for two questions: which types of the affective characteristics in the PISA survey produced a much higher correlation with the mathematic performance, and how they differently have an effect on it. The most interesting founding in this study is that motivation variables because the unique effect of intrinsic motivation variable is statistically influential only in US students' mathematics performance, and the unique effect of instrumental motivation variable is statistically significant only in Korean students' mathematic performance. Considering that intrinsic and instrumental motivations are correlated each other (r = .668 for US students and r=.781 for Korean students), it can be inferred that, regarding Korean students, intrinsic motivation is correlated with mathematic performance because of instrumental motivation; in fact, intrinsic itself is not correlated with mathematic performance. Similarly, in terms of US students, Instrumental motivation itself does not influence on the mathematic performance. The future implication in this study for the importance effects of the affective characteristics on mathematics education suggests that variables of the affective characteristics can be useful to clearly predict student mathematics performance and provide solutions to improve students' achievement.

Keywords: Affective characteristics, PISA, Quantitative analysis

EFFECTS OF COMPUTER BASED EXPERIMENT CARDS IN ELECTRICAL-ELECTRONIC EDUCATION

Hibetullah Kiliç, M. Emin Asker, Musa Yilmaz

Currently computer based training equipment are favorite part of education in vocational school of technical science and department of electrical-electronics entering. Lucas Nülle Uni-Train system is computer based tool that is used in laboratory for electrical-electronics engineering experiments. It is A host of multimedia courses are available for the UniTrain system in the areas of electrical engineering and electronics. Each of the courses consists of the training program, specific circuitry on one or more experiment cards and a browser (LabSoft) for the control, management and display of the training course. UniTrain courses convey practical skills by providing a theoretical basis then guiding students through numerous experimental measurements. Experiment cards are linked to the Interface and the training program via Experimenters. With the help of virtual instruments and power sources included with the system, circuits can be analyzed and results of measurements stored directly within the training program. In that paper it is focused on usage of Uni-Train set for electrical and electronics experiments and it is also revealed the effects of that set on electrical-electronics engineering

Keywords: Training equipment, Education in electrical & electronics, Lucas Nülle

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EFFECTS OF COURSE DELIVERY MODE ON STUDENTS' SELF-REGULATION SKILLS

Suleyman Ok, Tolga Erdogan, Osman Gazi Yildirim, Harun Cigdem

With the development of internet and Learning Management Systems, owing to their flexibility in delivery and instant access features, more and more instructors have started to blend or flip their courses by using online learning technologies like videos, online homework, and e-exams. In online learning applications, learners are encouraged to acquire and build their knowledge through interaction with a wide range of resources. For students to gain experience, it is important that they get hands-on practice as well as use time effectively during class periods in courses like Computer Programming. Students equipped with self-regulation skills perform better in choosing learning methods appropriate for their learning pace, completing learning tasks, and achieving learning objectives. Furthermore, students with good self-regulation skills can improve their learning both in blended and flipped courses. Building on this point, this study aims to investigate differences between students' self-regulation skills in a blended and a flipped course. Based on online self-regulatory perspective, five properties were chosen to be notably considerable for blended and flipped courses: perceived self-efficacy, perceived anxiety, interactivity in the online learning environment, perceived satisfaction, and perceived usefulness.The participants were 192 sophomore students enrolling at Computer Programming Course in a vocational college during fall semester of 2015-2016 Academic Year. Data were collected via an online questionnaire. Independent samples t-test was conducted to examine differences in self-regulation skills of students in flipped and blended courses. Flipped course participants reported significantly higher levels of perceived anxiety with online learning environments while blended course participants reported significantly higher levels of perceived satisfaction, perceived usefulness and self-regulation. In this sense, it is assumed that flexible environment of flipped classrooms lead to higher anxiety levels and urges students to seek more instructor guidance.

Keywords: Flipped learning, Blended learning, Self-regulation

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EFFECTS OF EARLY CHILDHOOD STEM ACTIVITIES TO THE CHILDREN'S PROBLEM-SOLVING SKILLS

Hasan Dilek, Adem Taşdemir, Ahmet Sami Konca, Serdal Baltaci

Nowadays, the STEM education in the science education based on design-implementation is applied to the different educational levels. The STEM's main aim is to provide guide toward children may work in the multi discipline as an engineer, they may put forward creative ideas, and they may find the appropriate resolution to the problems. The aim of this study was to investigate effects of STEM activities to the preschool children's problem-solving skills. In the study, the problem solving skills has been take from the indicators of " she/he say what is the problem, she/he suggest solution to the problem, she/he choose the one solution, she/he try this solution, she/he say about the reason of solution which she/he choose, she/he suggest the creative solution, and when she/he couldn't solution the problem, she/he choose a new solution" where present under the objective of "she/he find the solution to problem situations" in the National Early Childhood Education Curriculum. Also, these indicators have been determined as subscale in this study. The study is qualitative and has the features of case study. The activities that were implemented during six-week implementation process including piloting were thought as a case. Preschool children's problem solving skills were investigated during the process. Participants were 14 preschool children in Kırsehir determined by purposive sampling method. Willingness of participants was taken into consideration and requisite permissions were acquired. Data collection process was limited to six weeks and four activities relating the force. The activities contained the concept of force in the context of their daily experiences. The data was analyzed by categorical analysis which is a form of content analysis. The results revealed that most of the children determined the problem, and tried a solution to the problem. However, they had lack of creative solutions to the problems and they were unable to find and try a new solution after unsuccessful trials. Children were most active in activities relating force on the solids, but the water. Besides, there was difference between children's problem solving skills. Implications were made for further investigation.

Keywords: STEM education, Preschool children, Problem solving skills

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EFFECTS OF INSTRUCTIONAL CURRICULUM BASED ON COOPERATIVE LEARNING ON 7TH GRADE STUDENTS' MOTIVATION TOWARD SCIENCE LEARNING

Filiz Avci, Burçin Acar Şeşen, Fatma Gülay Kirbaşlar

The development of cognitive skills of students as well as the development of affective and psychomotor skills focused on the importance of providing in Science and Technology Curriculum. Motivation, which is one of the affective skills. The motivation towards learning science is a complex process which is curriculum, teaching-learning strategies, teachers and under the influence of individual properties of the students (Lee & Brophy, 1996). In this study, it was aimed to analyse the effects of instructional curriculum based on cooperative learning for the 7th grade Science and Technology lesson unit of "Structure and Properties of Matter" on students' motivation toward science learning. The study, which was done through a semi-experimental design with a pre and post-test control group, had been conducted with eighty nine 7th grade students from a Secondary School in İstanbul in 2013-2014. One class was randomly appointed as experimental group (N=46) and the other as a control group (N=43). In the experimental group, the topics was taught with the instructional curriculum based on cooperative learning which was developed by

the researchers and in the control group these subjects were covered by using 7th grade Science and Technology Curriculum which was approved by the Board of Education and Discipline and used in that academic year. As data collection tool, "Questionnaire for Motivation toward Science Learning" which consisting of 23 items had been developed by Dede and Yaman (2008) was implemented before and after the instruction in both groups. SPSS 16 were used for the analysis of the quantitative data. Wilcoxon Signed Rank test results showed that while there were significant difference between mean scores of experimental group before and after instruction, there were no significant difference between mean scores of control group. This reflected that Cooperative Learning Instructional Curriculum was highly effective on increasing students' motivation toward science learning when compared to the existing Science and Technology Curriculum.

Keywords: Cooperative learning, Instructional curriculum based on cooperative learning, Structure and properties of matter, Motivation toward science learning

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EFFECTS OF NUMBER TALKS ON NUMBER SENSES OF PRE-SERVICE PRIMARY TEACHERS

Derya Can, Burcu Durmaz

The aim of this study is to analyse the effects of the number talks on number senses of pre-service primary teachers. The participants of the study were 31 third grade pre-service primary teachers attending a teacher training program at a state university during the school year of 2015-2016. Given that the study deals with the effects of the number talks on number senses of pre-service primary teachers who were taking the mathematics teaching I course, it is designed as single group pre-post test research. The data collection tool was the number sense test developed by Kayhan Altay (2010). The data collected were analysed using SPSS 16.0. The findings of the study showed no significant difference in test scores of the participants. However, in regard to solutions of the problems in the test it was found that the number sense scores were significantly and positively significant. In other words, the participants mostly used those strategies based on number senses following the number talks activity. Several suggestions were developed based on the findings.

Keywords: Number sense, Number talks, Teacher education

EMPOWERING STEM-TEACHERS: TOWARDS AN INTERDISCIPLINARY STEM DIDACTICAL APPROACH

Nele Vandamme, Heleen Bossuyt

Despite the considerable amount of mathematics and science in secondary schools, a significant number of students experience STEM-courses as abstract and irrelevant. Because STEM is often divided into the different disciplines and taught as such, students build up very little experience in solving realistic multidisciplinary problems. In order to accomplish challenging STEM-education in which pupils acknowledge the relevance and the interaction amongst the STEM-disciplines, STEM-teachers need to be competent to increase the perceived relevance of their own discipline and to stimulate problem solving abilities of their students. In this project, we aim to develop an integrated STEM didactical course in which pre-service teachers are prepared both to develop/coach specific STEM-projects and to teach separate STEM-disciplines in such a way that links amongst the different STEM-disciplines are revealed. In a

preliminary study we investigated the view of STEM-educators on the current and ideal teaching approach of STEM-courses. The results show that for all disciplines the current approach focuses on specific discipline knowledge and algorithmic problem solving. All experts indicate the need of a transfer to a more interdisciplinary STEM-approach which focuses on developing problem solving techniques, conceptual thinking, linking different STEM-disciplines and context-rich learning environments. The main goal of the interdisciplinary STEM-course is to strengthen the PCK (pedagogical content knowledge) of pre-service teachers (specialized in a specific STEM-discipline) in order to accomplish an optimal implementation of the interdisciplinary STEM-aspects. To optimally educate pre-service teachers to powerful STEM-teachers, a STEM-course was developed in which:

- Pre-service teachers learn to acknowledge the shortcomings in the current approach in high schools.
- Good practice examples with the focus on inquiry based learning for multidisciplinary STEM-classes are offered.
- Pre-service teachers are enabled to implement relevant STEM-aspects in a variety of contexts.

Keywords: STEM, Pre-service teachers, Didactical course

ENVIRONMENTAL EDUCATION THROUGH ORNITHOLOGY LIKE OPTIONAL CLASSES

Carmen Gache, Gabriela Zbughin

Students from primary and secondary schools manifest a huge curiosity for nature and special high interest for the animals' life and behaviours. Unfortunately, the ordinary curriculum in Biology classes provides just summary information about animals' ecology, while data on their behaviour and complex interspecific relations established inside the ecosystems are completely missing. The Ornithology classes can be included in the students' curriculum through the curriculum in schools' decision. One course of ornithology can sensitise the young students waking their desire to learn more about the birds, to discover their necessities and the complexity of their behaviours, but also to learn how the people can help to improve the quality of birds' life. Through the fieldwork activities, the students learn also about the eco-tourism like friendly form of local sustainable development in harmony with the biodiversity of one region. The birds are very attractive through their plumage and songs, presenting a complex and very interesting breeding behaviour, but also a spectacular migration phenomenon. The birds are present near everywhere around us, populating a wide range of habitats, including the anthropogenic ones, which facilitate their study and observation. More than this, the birds are present any time during the seasons, even if their diversity is changing from one season to other. This allow us to identify the complexity of relations established between birds and their environmental, to understand the important position of birds in the trophic pyramids, to use these vertebrates like bio-indicators to assess the environmental quality and the trends in the ecosystems' dynamic.

Keywords: Ornithology, Environmental education, Birds, Fieldwork

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ENVIRONMENTAL SCIENCES IN THE CURRICULUM FOR LOCAL COMMUNITY DEVELOPMENT

Carmen Gache, Gabriela Zbughin

In Romania, in the rural areas, the curriculum of high school level can be related to the local community's necessities and interests, but also to the local resources through the segment of the curriculum for local community development. We present our school experiences in this field, using like case study the classes

of Environmental pollution in the rural area. This course is designate for the students from classes of technology high schools and its principal aims are related to two domains of competences: Management of interpersonal relations, respectively, Identification and monitoring of environmental quality in the rural areas. We follow to establish and develop professional interpersonal relations, abilities to manage the human conflicts and the expectations of stakeholders. The scientific component of the education through this course follows to assess the quality of air, soil and waters in our villages, learning about pollution's impact on organisms' health and ecosystems' functions, to identify and elaborate a monitoring scheme for the local pollution sources, but also to develop a control system of environmental qualities, to implement mechanism to reduce the pollution impact and to improve the quality of environmental parameters in our villages. About 50% of classes are rolled outside of classroom, like fieldwork activity in the school's vicinity but also in different points inside the villages and in its vicinity. Our school developed partnership with the regional authorities in environmental problems department (Agency of Environmental Protection – Botosani County ad Environmental Guard – Botosani County) which give us an important technical support. The evaluation process using individual working sheets, but also team working projects on topics related to pollution problems in our villages' area.

Keywords: Environmental sciences, Curriculum, Local community, School

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ETHICAL DISCUSSIONS IN SCIENCE THROUGH SOCIO-SCIENTIFIC ISSUES

Aysun Öztuna Kaplan

The importance of ethical values in science is widely recognized after '90s by scientists, society and politicians. The first reasons of getting such an attention can be stated as the effects of Cold War, biotechnology studies, the Human Genome Project and global warming since the ethical discussions of these topics are on the news. The second reason is the ethically questionable behaviors of some scientists that threaten the integrity and stability of scientific researches. The last reason is that science has strengthened its relationship with business world and industry and this has led ethical conflicts between scientific values and business world values (Resnick, 2004). These kinds of discussions bring ethical understanding into the focus of scientific researches and lead nature of science dealing with ethical values. The subject of this paper is ethics of science. In 2014-2015 spring term in a state university, the case study was conducted by a researcher with four students during the Scientific Values lectures on Values Education Master's Degree Programme at Educational Sciences Institute. Teachers who have been working on state schools formed the study group. Two of the participants are English teachers at high schools, one of the participants is religious culture and moral knowledge teacher at a high school and the other one is a preschool teacher. The aim of this study is to reveal the thoughts about ethical attitude in science of teachers who have been studying values education on master's degree and what kind of values are grounded on these thoughts. The data was collected via discussions and documents that were presented by the participants during the lectures. In this context, at first, the study group defined science; then, the group discussions were held about the well-known issues such as cold fusion experiment (1989), the Baltimore Case (1991), cloning human embryos research by Hall, Stillman (et.al, 1993). On the next step, the opinions of the group were asked about some 12 dilemmatic scientific researches in terms of socio-science and they drilled with the values that they based on during this process. On the last step, the participants were asked to determine a certain socio-scientific issue to examine and analyze in the ethical framework based on their personal choices. The participants were focused on cloning, transplantation, environmental ethics and GMO (genetically modified organisms) and they defensed their ideas about what should be the standards of ethical attitudes in science at the end of the semester. The conducted data was subjected to content analysis within the context of ethics theory and practices.

Keywords: Ethic, Science, Nature of science, Socio-scientific issues, Values education

EVALUATING THE CONTRIBUTION OF PHYSICS COURSES TO BASIC ELECTRONIC AND MEASUREMENT COURSE WITHIN THE FRAMEWORK OF TEACHING PROGRAM IN PROFESSIONAL HIGH SCHOOLS

Işik Saliha Karal Eyüboğlu, Salih Uzun

Courses in professional and technical high schools in Turkey can be grouped in four categories, namely common courses, professional courses, selective courses and guidance courses. Common courses, in addition to their particular aims, are expected to contribute to professional education. The EARGED (2010) Report evaluating the contribution of common courses to professional and technical education showed that their teaching programs are not designed according to the needs of professional high schools but kept the same as those followed by regular high schools. It was also stated in the report that students and teachers demanded physics courses be more efficient and overlapping by content with professional and common courses of the program for academic and professional achievements. A glance at the teaching programs of the fields Electricity-Electronics and Information Technologies will show that physics courses did not take place among the common courses until 2013 and the students being educated in these profession fields took the same physics course as a grade 9 general high school student followed. Arrangements made in 2013 imposed compulsory physics courses through grades 9 and 10 of all types of high schools including the professional ones. But it was noticed that studies indicating the extent to which those arrangements satisfy the needs of students and teachers were not carried out. This study intended to discuss the level of reaching physics knowledge needed in basic electronics and measurement course taught in Information Technologies Branch in professional high schools. The teaching programs of physics and basic electronics and measurement courses were examined and compared using the document analysing method. Results showed that the subject of electricity and magnetism which is useful for basic electronics and measurement was taken out from the physics syllabus of grade 9, some concepts of the subject to be taught in grade 10 were placed in the program of grade 11 and a simultaneity was not observed in the presentation of chapters of basic electronics and measurement and physics courses at grade 10. It is suggested that the same physics program applied to all types of high schools should be reorganised according to needs analysis and in modular form.

Keywords: Basic Electronics and Measurement, Physics, Teaching Program

EVALUATING THE LOYALTY OF CUSTOMERS WHO USE THE GSM OPERATORS WITH DATA MINING ACCORDING TO EDUCATIONAL STATUS

Asli Çaliş, Kamil Çelik, Cevriye Temel Gencer

Customer loyalty has become an all important factor under today's economic conditions. At first, consumer was consuming what manufacturer produced but today, manufacturer produces what consumer wants. Because, there are many equivalent of products which customers buy. In this study, customer loyalty survey related to GSM operators was applied to 454 people who use three biggest GSM operators of Turkey. The analysis was performed by using decision trees which are one of the Data Mining method. It was aimed to measure the customer loyalty according to educational status with C 5.0 algorithm and the results were interpreted.

Keywords: GSM operators, Customer loyalty, Data mining.

EVALUATION OF 9TH GRADE CHEMISTRY TEACHERS' KNOWLEDGE OF ASSESSTMENT IN THE CONTEXT OF PHYSICAL AND CHEMICAL CHANGES

Ayşe Zeynep Şen, Canan Nakiboğlu

Assessment knowledge, one of the components of pedagogical content knowledge (PCK), is quite important for teachers. To determine if the teaching is concluded with success or not is possible only with a suitable assessment and evaluation of the data. Otherwise, students' knowledge structure cannot be revealed and also the success of teaching cannot be determined. Besides, not adressing questions to students during the lessons to determine possible misconceptions of them, correspondingly not being able to correct the misconceptions cause students carry on their misconceptions and prevent students from learning following subjects. Physical and Chemical Changes (PCC) subject is one of the basic and essential subject of chemistry, and also is related to daily life. Learning this subject meaningfully depends on learning particulate structure of matter and chemical bonds correctly. In this qualitative study the chemistry teachers' PCK about knowledge of assessment towards PCC was investigated. The study conducted with three chemistry teachers, the data were collected by observation, interview, and analyzing exam questions within the context of PCC carried out at 9th grade. The teachers' experiences were over 25 years and they were working at different schools. It was concluded that the teachers asked open-ended questions for assessment of PCC during the lessons, but in the exams they did not ask any question or they preferred multiple choice questions. Their questions were usually at knowledge, comprehension, apply levels but rarely upper levels according to the Bloom Taxonomy. It is found that, with these questions, their aim was to determine the students' prior knowledge about PCC and to understand if the students have understood the subject or not. It was also found that the teachers had information about assessment relatively, but this was not sufficient.

EVALUATION OF MATHS MOTIVATION OF GIFTED AND NORMAL STUDENTS

Yasemin Deringöl, Duygu Ün

One of the most important affective factors in learning a subject is motivation. In other words, the more motivated a student is, the more succesful he/she becomes. The role of motivation in learning Maths, which is one of the most difficult courses to learn, is so significant as not to be arguable. Accordingly, the purpose of this study is to identify maths motivation of students at grade 4. The sample of the research is composed of gifted and normal students at grade 4 who receive education in İstanbul in the academic year 2015-2016. The research is in scanning category and descriptive method is used. As a means of collecting data in line with the main purpose, "Personal Information Form" developed by the researcher and "Maths Motivation Scale for Students at Grade 4" developed by. Tahiroğlu and Çakır(2014) is used. Maths Motivation Scale for Students at Grade 4 is composed of 32 items including 5 sub-dimension such as "Motivation for Being Appreciated", "Motivation for Affection, Desire and Needs", "Motivation for Developing Self-Confidence", "Motivation for Being Successful" and "Motivation for Goals". Internal consistency co-efficients of five sub-dimensions of this scale are .91,.92,.89,.85, and .70 respectively and .93 for the whole scale. Analysis will be made in line with the sub-problems of the research and results will be debated in line with the related literature and recommendations for he body of literature will be presented.

EVALUATION OF SUPERVISIOR TEACHERS ACCORDING TO OPINIONS OF MATH TEACHER CANDIDATES

Abdullah Sürücü, Ali Ünal, Atila Yildirim

Student teacher learns to whom, why and where to teach theoretically through teaching profession knowledge lessons. And the skill to use the theoretical knowledge is learned through School Experience and Teaching Practice lessons in Turkey. In gaining these skills, the personal and professional characteristics of the practice teacher at the school where the student teacher had his internship are of importance. This research aims to determine the ideas of the student teachers who are studying elementary school maths teaching about the personal and professional characteristics of the Teaching Practice lesson teachers. In line with this aim, the ideas of the student teachers were determined with regard to how they evaluated the practice teachers who are in charge of teaching practice lesson. The study group of the research consists of the senior year students who are studying at Elementary School Maths Teaching at Ahmet Keleşoğlu Faculty of Education at Necmettin Erbakan University. The data was collected with an unstructured question in which the student teachers were asked to evaluate the practice teachers in personal and professional terms. The data was evaluated by making content analysis.

Keywords: Math teacher candidate, Supervisior teacher

EVALUATION OF THE INFORMATION TECHNOLOGY AND PROGRAMMING COURSE CURRICULUM BY TEACHERS' OPINIONS: A DELPHI STUDY

Veysel Demirer, Nurcan Sak

The production and sharing of the knowledge changes in the transition to an information society. In this process, information and communication technologies began to be used more in the educational environments. Bringing computers to public schools in the 1980s is an important step in ICT education. ICT courses were included in the curriculums in 1997. After determining the basic ICT competences at the national level, radical changes were made in ICT education and the name of the course called "Information Technology and Software". In 2013, this course has been included among the compulsory courses. With these changes, IT course content also has been expanded by adding software and programming issues. The evaluation methods are great importance the renewal and development of the ICT education program. Therefore, the aim of the study was to evaluate "Information Technology and Software" course curriculum. In this context, the Delphi technique was used to gather the views of teachers on the current course curriculum. In this way, IT and Software course curriculum were evaluated by the experts and the current situation of the program were investigated. Lastly, suggestions were made to improving the quality of the program.

Keywords: Curriculum evaluation, Delphi technique, Information Technology and Programming Course

EXAMINATION OF ADOLESCENTS' COPING WAYS WITH CYBERBULLYING

Ömer Gökdemir, Ahmet Oğuz Aktürk

With the rapid development in information and communication technologies, increase in quality and quantity of various tools that are compatible with internet also augments interpersonal communication and interaction opportunities on the internet. This increase in interpersonal communication and interaction on virtual platforms, however, brings a set of problems along, too. One of these problems is the use of the virtual platform technologies by the young to bully their peers (cyberbullying). Considering 12 to 20 years of adolescents, being the most engaged people with virtual platforms, and who are called the digital natives; ascertaining adolescents' coping ways with cyberbullying is thought to be important. The purpose of this study is to examine 9, 10, 11 and 12 grades high-school adolescents' coping ways with cyberbullying on the basis of gender, high-school type and Facebook member variables. Survey model was used as the research method. The study was conducted with 301 adolescents from two different high-schools in a city in the centre of Turkey. "Coping with Cyber Bullying" consisting of 17 items and 4 factors was used to obtain research data. Findings obtained from the research show that adolescents' coping ways with cyberbullying are generally elevated. Additionally, while there is a significant difference in favour of female adolescents in coping ways with cyberbullying in terms of gender; there is, on the other hand, a significant difference in favour of adolescents studying from common high-schools in terms of school type. Finally, coping ways with cyberbullying according to whether the adolescents are members of Facebook, differentiated on a significant level in favour of the ones that are not members of Facebook.

Keywords: Coping with cyberbullying, Adolescents, Gender, Facebook membership.

EXAMINATION OF EXPERIENCED CHEMISTRY TEACHERS PEDAGOGICAL CONTENT KNOWLEDGE TOWARDS 9TH GRADE CHEMISTRY CURRICULUM

Ayşe Zeynep Şen, Canan Nakiboğlu

One of the components of pedagogical content knowledge (PCK) is knowledge of the curriculum. Curriculum serves as a guide for teachers during the teaching process. They also provide a togetherness among teachers in terms of aims, goals, acquisitions, subject order and subject matter knowledge. Therefore, the teachers' sticking to the curriculum which belongs to the level of class is quite important for teaching. The aim of this study is to analyze the teachers' PCK about what extent the teachers' using of 9th grade chemistry curriculum, taking into consideration the objectives, goals and acquisitions. The study was designed as a case study, a kind of qualitative research design, and it was performed with 3 experienced chemistry teachers during the spring semester of 2014-2015 education year. The teachers' experiences varied from 26 to 36 years, and they were working at different schools but they are teaching chemistry according to the same curricula. The data were collected by observations, interviews and lesson plans. It was found that the teachers' PCK related to the 9th grade chemistry curriculum was not sufficient generally. The teachers did not stick to the curriculum exactly. Instead, they thought that, it was enough to follow the coursebook, even they could intervene the curriculum if it was necessary according to them. At the same time, it was determined that the teachers were not able to fulfill the aims, goals and acquisitions in the curriculum strictly. It was also concluded that two of the teachers were informed about the philosophy of the curriculum, thanks to the workshop that they had attended before, and they designed the teaching process in this way. By the development of experienced teachers' knowledge of curriculum component of PCK, it can be provided that the teachers become much more programmed about implementation of the course.

Keywords: Pedagogical content knowledge, Curriculum knowledge, 9th grade chemistry curriculum, Experienced chemistry teachers, Physical and chemical changes

EXAMINATION OF HIGH SCHOOL STUDENTS' ENVIRONMENTAL ATTITUDES ACCORDING TO THEIR SELF EFFICACY BELIEFS

Canan Koçak Altundağ, Ayşem Seda Önen

The purpose of the environmental education is to educate individuals as environment friendly persons who are sensitive to their environments and who have positive attitudes and behaviors towards environmental issues. Instead of transmitting core information on the environmental issues in elementary education, the students should be encouraged to gain necessary upbringing and attitudes concerning the environmental issues. The aim of this study was to examine the relationship between high school students' self-efficacy beliefs and attitudes towards environment. The study sample consists of 994 students enrolled in high schools in downtown Ankara. Survey model was applied, and "Environment Attitude Scale" developed by Ünal (2010) was used for data collecting instrument in the research. In order to determine high school students' efficacy beliefs, "The Scale for Efficacy Expectancy in Adolescents" designed by Muris (2001) and adapted to Turkish by Çelikkaleli, Gündoğdu, and Kıran-Esen (2006) was used in the study. The factor analyses conducted for validity studies showed that the scale has the same three-factor structure that the original does. These factors are: academic efficacy expectancy, social efficacy expectancy, and emotional efficacy expectancy. The study checked whether students' environmental attitudes according to their academic efficacy expectancy, social efficacy expectancy, and emotional efficacy expectancy. According to the data obtained from the study, it was seen that high school students' attitude towards environment according to their self-efficacy beliefs. When findings were examined, it was seen that students have different self-efficacy beliefs level. Moreover, it was found that there is a positive meaningful relationship between their self-efficacy beliefs and their attitude toward environment. This result indicates that self-efficacy beliefs is a positive predictor of attitude towards environment. At the end of the study, suggestions were given for further research and researchers.

Keywords: Environmental attitudes, Self efficacy beliefs, High school students, Environmental

EXAMINATION OF PRESERVICE TEACHERS' ATTITUDES TOWARDS SUSTAINABLE ENVIRONMENT IN TERMS OF VARIOUS VARIABLES

Burcu Uğurlu, Ayhan Çinici, Nihat Şireci

Sustainability has been defined as living generations' fulfilling their improvement without endangering next generations' opportunities to meet their persisting needs. Accordingly, the concept of sustainability can be expressed as a development process also going on in future. Therefore, firstly the concept of sustainable development, then the concept of sustainable environment appeared. In this sense, both teaching of sustainability conceptually and developing of positive attitudes towards this issue have become an important matter of educational research. In this process, individuals aimed to develop cognitive, affective and psychomotor acquisitions towards natural, social and cultural environment. Thus, it is found out that, primarily the mentioned development of teachers and preservice teachers should be supported. In this study, attitudes of preservice teachers studying in different programs and at different grades in education faculty towards sustainable environment were aimed to be compared in terms of various variables (program, grade and gender). 330 preservice teachers studying in three different programs (Science Teaching, Social Sciences Teaching and Primary School Teaching) in education faculty in a state university in the South-Eastern Region of Turkey were involved in the study. The data was collected

through measurement means of "The Attitude Scale within Education of Sustainable Environment". Descriptive analysis techniques were employed for the data analysis. At the end of the study, the point averages of the preservice teachers towards sustainable environment were calculated as, in terms of their gender, Xfemale = 4.13, Xmale = 3.92; in terms of programs they are studying in, Xscience = 4.08, Xsocial = 3.86, Xprimary = 4.19 and finally, in terms of their grades, X2nd grade = 4.06, X3th grade = 4.07. In order to test the significance of these differences among averages determined through descriptive analysis independent groups t test (for variables as grade and gender) and one way variance analysis (for variable as program) methods were used. As a result, a significant difference was found ($p > .05$) among the attitudes of preservice teachers towards sustainable environment in terms of gender. However, there is no significant difference regarding grade. Preservice social science teachers have statistically significant difference in terms of program variable compared to preservice primary school teachers and preservice science teachers. These differences among the groups in terms of attitude for sustainable environment were discussed by comparing with other studies related to the issue and various suggestions were made.

Keywords: Sustainable environment, Sustainable development, Attitude, Preservice teachers

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EXAMINATION OF PROSPECTIVE CHEMISTRY TEACHERS' PEDAGOGIC CONTENT KNOWLEDGE CONCERNING GRAPHS ABOUT SOLUTIONS, SOLUBILITY, AND CHANGE OF STATES TOPICS

Cem Gültekin, Canan Nakiboğlu

Shulman (1986) presented pedagogical content knowledge (PCK) as central to the knowledge base of teachers and described PCK as "that special amalgam of the content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding". This study examined three components of PCK: knowledge of the curriculum, knowledge of assessment and knowledge of strategies for subject matter teaching. The study focused specifically on the prospective chemistry teachers' PCK of teaching graphs about solutions, solubility, and change of states topics to grade-9 students. The study was designed as a case study, a kind of qualitative research design, and it was performed with 8 prospective chemistry teachers. The data were collected through lesson plans. Five prospective teachers were asked to prepare a lesson plan concerning solutions and solubility topics and others prepared a lesson plan concerning the change of states topic. It was concluded that the prospective teachers included in their lesson plans the achievements for the improvement of graphing, reading and interpreting skills related to the subject matters of the change of states, solutions and solubility. Regarding the graphing skills, they focused on the determination of the dependent and independent variables and their placement on the axes. As for the interpretation, they concentrated on ensuring that students can interpolate, extrapolate and calculate the relationship between the variables. It was observed that the prospective teachers generally adopted the discovery learning method, but they resorted to inquiry-based learning, meaningful learning and problem-based learning strategies as well. In the activities developed for drawing, reading and interpreting graphs, the experiment method, discussion method, game method and collaborative learning technique were employed. They made use of open-ended questions about graph drawing and open-ended and multiple-choice questions about graph reading and interpreting in measure assessment and evaluation process.

Keywords: Pedagogic content knowledge, Graphs, Solutions, Solubility, Change of states.

EXAMINATION OF STUDENTS' CREATIVITY IN A STEM CAMP: EXPLORING STEAM

Ayse Tugba Oner, Sandra Nite, Mary Margaret Capraro, Robert M Capraro, Luciana R. Barroso

To be a successful person in the 21st century, one needs to have science, technology, engineering, and mathematics (STEM) knowledge and skills. However only pure STEM knowledge and skills are not sufficient to be a qualified person. One also needs to have artistic skills. This requirement adds on another letter, A, to STEM, which stands for Arts. The art aspect of STEAM was commonly referred as creativity in education (e.g., Land, 2013; Kang, Jang, & Kim, 2013; Kim et al., 2012; Madden et al., 2013; Sousa & Pilecki, 2013). In 21st century, STEAM has gained popularity. For instance, students' artistic skills, creativity, shape their projects and make them uniqueness. Therefore, while projects require creativity, it is important to increase their skills in the informal STEM learning environments. In this study, middle and high school students' perceptions about the use of their creativity in STEM projects in a STEM summer camp was examined. Nine courses were offered in the STEM summer camp, at a Tier 1 university in the southern part of the United States: bridge building, trebuchet building, renewable energy, 3D design, application design, design of brochures and movies, cosmetics chemistry, cryptography. 129 students attended two-week long summer camp. However, only 91 of them preferred to answer both pre and post test questions. To understand students' perceptions about the creativity usage in activities, questions on a Likert scale and an open-ended question were asked. Study findings revealed that attending STEM summer camp increased students' belief about using their creativity during their STEM career. In addition, students also believed that they used their creativity during following courses: bridge building, trebuchet building, 3D design, renewable energy, and application design.

Keywords: STEM, STEAM, Creativity, Informal learning environment

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EXAMINATION OF THE PRIMARY TEACHER CANDIDATES' TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) COMPETENCIES AS TO DIFFERENT VARIABLES

Akin Karakuyu, Yunus Karakuyu, Yusuf Ay

The aim of this study is examination of primary teacher candidates' technological pedagogical content knowledge (tpack) competencies as to gender, high school type and overall academic average. 308 primary teacher candidates student in final year spring 2014-2015 at department of primary school teaching constitute the sample of the research. Survey method used for the study. Data was collected with the TPACK Scale adopted to Turkish by Sahin (2011). So as to analyze the data obtained, Independent samples t test and one way ANOVA was used. According to the research reseults while there was no difference between gender variable (t(306): -1,831, p>0,05), there were significant differences between high school type and overall academic avarage (F(4, 303)= 5,055 p

Keywords: TPACK, Primary teacher candidates, Technology integration

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EXAMINING ECOLOGICAL FOOTPRINT AND SUSTAINABLE ENVIRONMENTAL ATTITUDES OF EIGHTH GRADE STUDENTS

Ayhan Çinici, Fatma Demirtaş

Human beings and all other living things with abiotic factors constitute environment. Within this unity, the relationship of man to nature is in a constant change, transformation and harmony. In order to continue the process of this transformation and harmony as a healthfully and sustainably, development of social consciousness and ensuring the durability of the social consciousness are very important as well as legal regulations. In this study, it was aimed to investigate eighth grade students' sustainable environmental attitudes and ecological footprints in terms of different variables. The study group composed of 537 eighth grade students from Kahramanmaras and Adıyaman province centres and villages in the academic year 2013-2014. In the research, as a data collection tool to measure students attitudes towards sustainable environment, sustainable environmental attitude scale which consists of 23 Likert type items and an online ecological footprint calculation questionnaire consisting of 21 items towards students consumption habits was applied. At the result of the study it was found that 8th grade students' both ecological footprints and attitude towards sustainable environment was at high level, and also significant differences in terms of ecological footprints were also found between the students living in city centres and villages in favour of the students living in city centres. On the other hand, when the data were examine in terms of gender, it was revealed that female students' mean score regarding attitudes towards sustainable environment was higher than males. In the light of the findings mentioned above, it can be said that although 8th grade students' attitudes towards sustainable environment at the high level, their ecological footprints is also high. As a result, the causes of the emergence of high ecological footprints, despite the high attitudes towards sustainable environment, were discussed and suggestions were made in terms of educational implications.

Keywords: Ecological footprint, Environmental education, sustainable environmental attitude.

EXAMINING PRIMARY SCHOOL TEACHERS' PARTICIPATION PATTERNS IN AN ONLINE FOLLOW-UP PLATFORM AFTER A PROFESSINAL DEVELOPMENT WORKSHOP

Canan Güneş, Serkan Özel

ICT is a hot topic in the field of education since the development of computer technologies in 1980s. Studies show that primary school teachers necessitate participating in effective PD programs on technology and pedagogy in order to develop competency for integrating ICT in their teaching. Effective PD programs include ongoing activities instead of one-shot workshops. Face-to-face follow-up activities might cause some economical and logistic challenges. Concerning these challenges, online forums might be an efficient alternative to face to face ones. Studies show that individuals can supply online support for each other by exchanging their own experiences. However, the online platforms may not guarantee the same amount of teacher participation and teacher knowledge construction which constitutes the teachers' participation patterns. In this study we examined the variations in Turkish primary school teachers' participation patterns in an online forum platform, which was set as a follow- up for a PD workshop about ICT integration. Ten ICT workshop groups -6 from Istanbul, 2 from Izmir, and 2 from Ankara- were formed. Each group, consisted of 15 teachers in average, attended the same workshop in different weeks. The workshops started in February and will end in early April. We examined whether teacher demographics, workplace conditions, and attitudes towards ICT use in education predicted the variation in teachers' participation pattern in the online platform. The research is an ongoing study which is conducted via mix methods methodology. In order to examine the variability in teachers' cognitive presence in the online forum we will follow the practical inquiry model of analysis as a method of quantitative content analysis. We will use posted messages to the discussion topics to calculate weekly percentages in order to see the overall trend in the level of cognitive presence. Social network analysis (SNA) will be conducted in order to check the variability of teachers' centrality in the online forum. By using SNA methods, we will be able to depict participants' individual position within the whole community.

Keywords: Professional development, Online follow-up, ICT

EXAMINING PROBLEM POSING SKILLS OF PROSPECTIVE MATHEMATICS TEACHERS ON ALGEBRAIC EXPRESSIONS

Ömer Şahin, Bilal Öncü

According to Renewed Middle School Mathematics Curriculum problem solving is one of the most important mathematical skills (MEB, 2013). To improve problem solving skills of the students it is necessary to pose proper problems in accordance to the nature of concepts. The most important task in providing it falls to teachers who perform the learning activities (Işık, 2011). In this context the purpose of the study is to examine prospective mathematics teachers' problem posing skills in algebraic expression such as equalities, inequalities . The participants of the study were composed of 178 prospective teachers, 56 first grade, 42 second grade, 38 third grade and 42 fourth grade, studying in the elementary mathematics education department of a university in Turkey . Explanatory-confirmatory, one of the mixed research methods, was used as the research design of this study. İn this research method firstly quantitative findings are obtained. To support and understand more deeply qualitative findings the help of quantitative data is used (Johnson ve Christensen, 2004). In this context, in the study as the data tool Algebra Problem Posing Test (APPT), constructed by the researchers, which is composed of open-ended expressions was used. The AAPT is composed of 8 algebraic expressions in the form of 3b-2, x+2=10 and m+n=10 ,If m < n. Besides semi structured interviews were conducted to more detailed analysis the proplem posing process. In conclusion, it was observed that prospective teachers mostly posed routine problems. For example, prospective teachers mostly posed " The sum of a number and 2 is equal to 10. Then find the unknown number." which is a routine problem for the x+2=10 equation. Most of prospective teachers were able to pose problem for 3b-2 after trasforming it into an equation. Also it was seen that prospective teachers had difficulties in posing problem in different themes.

Keywords: Prospective teacher, Problem posing, Algebra, Equation, Inequalities

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EXAMINING THE ATTITUDES ACCORDING TO VARIOUS VARIABLES TOWARDS THE TEACHING PROFESSION OF ELEMENTARY MATH TEACHER CANDIDATES

Cenk Keşan, Yusuf Erkuş, Mehmet Çağlar Coşar, Deniz Kaya

Bu çalışmanın amacı, İlköğretim Matematik Öğretmenliği programında yer alan 1., 2., 3. ve 4. sınıf öğrencilerinin öğretmenlik mesleğine yönelik tutumlarının sınıf düzeylerine ve çeşitli değişkenlere göre değişip değişmediğini belirlemektir. Bu amaçla İlköğretim matematik öğretmenliği programında yer alan Öğretim üyelerine "Gözlemlerinize göre öğretmen adaylarının mesleğe ilişkin tutumlarını ne ya da neler etkilemektedir?" sorusu yöneltilmiştir. Öğretim üyelerinin verdiği cevaplar incelenmiş ve bu cevaplardan edinilen bilgiler doğrultusunda öğrencilere ölçekle birlikte verilen "öğrenci bilgi formunda" çeşitli sorular yöneltilmiştir. Öğrencilerin doldurdukları formdan elde edilen verilerle "öğrencilerin öğretmenlik mesleğine yönelik tutumlarının; adayların cinsiyetleri, ÖSS/LYS'de tercih sıraları, ailenin sosyoekonomik düzeyi (SED), kaçıncı sınıfta oldukları ve öğretmenlik mesleğini tercih nedenleri vb. değişkenlerine göre farklılık gösterip göstermediği" sorularına yanıt aranmıştır. Araştırmanın örneklemini İlköğretim Matematik Öğretmenliği programında okuyan 1., 2., 3. ve 4. sınıf öğrencilerinden toplam 400 öğretmen adayı oluşturmaktadır. Örneklemde yer alan öğretmen adaylarının tamamına veri toplama aracı uygulanmıştır. Araştırmada veri toplama aracı olarak Üstüner (2006) tarafından geliştirilen ve Likert tipi beşli olarak derecelendirilen tek boyutlu bir ölçme aracı olan "Öğretmenlik Mesleğine Yönelik Tutum Ölçeği" kullanılmıştır.

Keywords: Attitude, Teaching profession, Math teachers candidates, Teacher training

EXAMINING THE DIFFERENT VARIABLES OF SELF-EFFICACY BELIEFS OF TURKISH LANGUAGE TEACHERS RELATED TO USAGE OF COMPUTER AND TECHNOLOGY

Tahir Gür

Self-efficacy is confidence in an individual's ability to cope with situations that may arise and be successful. Zimmerman defined self-efficacy "it is a belief that one of the important factors effect individual's ability to perform a job". Teachers' self-efficacy beliefs have great importance related to usage of computers and technology in using computer and educational technology in and out classrooms. We studied with 118 Turkish language teachers working in the city of Gaziantep. For gathering data "self-efficacy scale for the use of computers and technology" used and analyzed in SPPS program. According to the findings, more experienced and older teachers were found to be less self-efficacy beliefs on the usage of computers and technology. In-service training for teachers, more computers and technology activities were to be added to curricula, production of higher quality and quantity of programs were proposed as possible solutions.

Keywords: Self-efficacy, Turkish teachers, Computer, Technology

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EXAMINING THE EFFECT OF CELL DIVISIONS ACTIVITIES ON CONCEPTUAL UNDERSTANDING OF PRE-SERVICE SCIENCE TEACHERS

Olcay Sinan, Metin Şardağ

In the relevant literature and teaching experiences, it is frequently told that students have difficulties in understanding of some basic concepts that are related to mitosis and meiosis divisions. In this study, a series of activities were designed and implemented in order to solve the problems related to the concepts that pre-service science teachers have difficulties to understand. In addition, the effect of these activities was investigated on the conceptual understanding of cell divisions. First of all, concepts that the students have difficulties in understanding about cell divisions were determined in line with the literature and expert view. Homologous chromosome, sister-chromatid, haploid cell (n chromosome), and diploid cell (2n chromosome) concepts were determined to be the most critical concepts, and the activities that are suitable for these concepts were designed. After cell divisions presented theoretically with conversational method, students worked cooperatively forming groups of six in five tables. After necessary materials (paper, thread, magnetic bars in different colors, peanut shells, scissors, etc.) were given to each group, the groups were asked for working collaboratively according to the given instruction and constructing cases of cell chromosomes and stages of cell divisions, respectively. The students' studies were controlled at each step by the instructor and the photographs of materials prepared by students were taken. After this process was done in each group, it was passed to next stages. The study was carried out with 30 students who were sophomore and studying at science education department of a state university. Responses, which were given about cell division in final exam, were used as data. Moreover, in order to obtain further information about implemented activities and students' learning, semi-structured interviews were conducted with the six students who were selected randomly among these students. When the responses students gave to exam questions were examined, it has been understood that 90% of the students have an understanding about the basic concepts related to cell division. Moreover, in interviews with students, it has been determined that many confused concepts before the activities has clearly been understood. Same students have expressed that carried out activities were beneficial and entertaining and such activities were necessary for a better understanding following the theoretical information.

Keywords: Cell divisions, Conceptual understanding, Biology education

EXAMINING THE EFFECT OF CLASSROOM MANAGEMENT PROFILES ON MATH TASK VALUE

Eyup Yurt, Fatih Bozbayindir

The main purpose of all of the activities carried out in classroom environment is to help student learn effectively. Effective learning depends on a variety of factors. Among these factors, teachers' classroom management profiles are known to be really significant. This study attempts to reveal the effect of teachers' classroom management profiles (authoritarian, authoritative, laissez-faire and indifferent classroom management profiles) on students' perceptions of math task value. The sample of the study was 233 middle school students. The data were collected via classroom management profiles scale, which was developed by Ekici (2004) and adapted for middle school students by the researchers, and self and task value in mathematics scale (Yurt and Akyol, 2015). Correlation and regression analyses were used to examine the relationships between the variables. The findings revealed that the effect of classroom management profiles on math task value were as follows: authoritative classroom management ($β$= .63, p.05) and authoritarian classroom management ($β$= -.04, p>.05) The results obtained indicated that students' math task value can increase if math teachers adopt authoritative classroom management and avoid indifferent classroom management.

Keywords: Classroom management profile, math task value perception, middle school, math course

EXAMINING THE RELATIONSHIP BETWEEN TEACHERS' SELF-EFFICACY BELIEFS, ACADEMIC SELF-EFFICACY BELIEFS, EPISTEMOLOGICAL BELIEFS, AND LEARNING STRATEGIES FOR BIOLOGY TEACHER CANDIDATES

Duygu Gülev, Beril Akin

In this research, it was aimed to determine self-efficacy beliefs, academic self-efficacy, epistemological belief levels and levels of using learning strategies of biology teachers and to examine relations among these variables. It was also examined in the research that whether self-efficacy beliefs, academic self-efficacy, epistemological belief levels and levels of using learning strategies of teaching differ significantly by gender, high school type, class level they study and academic grade point average of teacher candidates or not. The research in which relational screening model is used was conducted with 148 biology teacher candidates in total who are studying at state universities located at Ankara province in fall semester of 2013-2014 academic year. The research data were collected by using Teaching Self-Efficacy Belief Scale, Academic Self-Efficacy Scale, Epistemological Belief Scale and Learning Strategies Scale. It was found in the end of the research that biology teacher candidates have high self-efficacy beliefs and academic self-efficacy. It was determined that teaching self-efficacy and academic self- of biology teacher candidates do not differ significantly by gender, high school type, class level they study and academic grade point average of teacher candidates. Besides, it was found that there was statistically significant difference between teaching self-efficacy beliefs and class levels biology teacher candidates study. It was determined that the beliefs of biology teacher candidates whose opinions were received within the scope of the research regarding that teaching at epistemological belief level depends on effort, learning depends on the ability and only one truth exists are generally high. In similar way, it was determined that epistemological belief levels of biology teacher candidates differ significantly by the class level. It was found that teacher candidates generally use cognitive learning strategies; while levels of using learning strategies do not differ by high school type biology teacher candidates graduated, they differ significantly by class level and

academic grade-point average. It was found in the end of the research that there is a low-level relation among teaching self-efficacy beliefs, academic self-efficacy and epistemological belief levels of biology teacher candidates; there is low and medium-level relation among learning strategies. Besides, a low and medium-level relation was found between epistemological belief levels and learning strategies of biology teacher candidates.

Keywords: Biology teacher candidates, Self efficacy beliefs, Academic self efficacy beliefs, Epistemological beliefs, Learning strategies.

EXAMINING THE TRANSFER OF LANGUAGE FROM SCIENCE TO MATH WRITING: AS AN EPISTEMIC TOOL

Ali Cikmaz, Yejun Bae, Brian Hand, Kyong Mi Choi

The purpose of this study to examine how students transfer their language practices from science classrooms to math classroom in terms of writing activities. For this aim, 64 5th grade students, who were familiar with the SWH approach that supports multimodal writing from their science classrooms, participated in the study. The students were provided questions to complete a writing activity in their math classrooms in each semester. Multimodal writing samples from two consecutive semesters, and scores of Cornell Critical Thinking (CCT) Test, conducted at the beginning and the end of year, were collected. The findings suggest that students were able to use the writing and representational work from science classrooms to math classrooms, and across time from the first semester to second semester, they improved their math writings in terms of multimodality, and also, writing scores are also significantly predictor of final CCT scores. In conclusion, when students have a rich learning environment, in this context it was the SWH approach, they learn not only content knowledge but also how language can serve as an epistemic tool. It is this use of language that, we believe, is being transferred into new context and is improved by the time.

Keywords: Science writing, Language, Transfer of knowledge, Critical thinking

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EXEMPLARY TECHNOLOGY INCORPORATED CONTEMPORARY ACTIVE LEARNING ENVIRONMENTS FOR STEM COURSES

Mustafa Erol, Ahmet Ozcan

Unprecedented innovations have been experienced since the second half of the twentieth century although there have not been fundamental changes in learning environments throughout the history. The reasons of these changes can be grouped mainly into two categories: 1) The development of new learning-teaching approaches such as constructivism, active learning, life long learning, etc. 2) The fast incorporation of technology into education like in every part of our life. More developments in learning environments will not be surprising in the near future. Traditional classrooms and technology incorporated contemporary active learning environments have been compared in this study. Literature review has been carried out about technology incorporated active learning environments, which are being innovated continually and designed especially for STEM courses, and prominent contemporary classrooms have been compiled. In this context, physical medium and pedagogical approaches of contemporary classrooms such as SCALE-UP, TEAL, TILE, Next-Gen ALC, etc. have been examined and the results obtained by research

carried out in those classrooms have been presented. Moreover, these classrooms have been compared according to various features. In accordance with the findings, suggestions have been made for faculties and higher education authorities, and the usage of these kinds of learning environments have been encouraged as part of academic culture. Besides, some predictions have been made about the possible innovations in learning environments in the following years.

Keywords: Active learning, Contemporary classrooms, Technology incorporated, STEM courses, SCALE-UP

EXPERIENCING INQUIRY WITH KINDERGARTEN: SCIENCE FOR KIDS

Ayşe Oğuz Ünver, Sertaç Arabacioğlu, Hasan Zühtü Okulu

Inquiry is not just about motivating children by engaging them in hands-on activities but also equipping children with the necessary skills for observing, questioning, predicting, debating, reflecting on data evidence, make logical sense of their observations in a structured manner. Even though many research is available for supporting these skills there has been some doubted on how to fit in inquiry skills with the age group 4-6. Therefore, this study aims developing inquiry strategies through authentic activities with pre-school students ages 4-6 (n=45). The frame of the activities is starting with a real problem such as "Have all the stones sink?", and then children discuss the issues by predicting. On the next level teacher encourage them to build observation, experiment and data-handling. Finally they report and reflect what they discover through their evidence by working collaboratively with others and communicating their own ideas and considering others' ideas. During the program 14 sequential inquiry activities on different subjects were settled and performed at least 3 hours for each week. Sport, art and technology such as children games, stories, poems, songs, drama, gymnastic, painting, matchup, puzzles, classification and so on were used as a tool for data-handling since they illiterate. During the process children's reasoning pattern and representing of data in various forms are improved. Over the time their verbalizing skills enhanced and finally science is not only magic and entertaining activity for them but also it is real and applicable for life.

Keywords: Inquiry, Science activities, Hands-on, Minds-on

EXPERIMENTS IN TURKISH CHEMISTRY EDUCATION: A REVIEW OF RESEARCH

Ela Ayşe Köksal, Hülya Kahyaoğlu

An important element of educational programs is educational experience, which is learning/teaching process (Emre, Turan, & Bahşi, 2007). In science education, experiential learning and laboratory is an important element of learning/teaching process (Ayvacı & Küçük, as cited in Emre et al, 2007). Laboratory helps students learn by starting with concrete, close, and known and making learning easy and effective (Emre et al, 2007). When students relate science with life, they will learn easily, increase interest, and develop attitudes toward science (Akgün, as cited in Emre et al, 2007). Unfortunately due to curriculum; physical structure of laboratory; cognitive, affective and psychomotor preparedness of teachers and students there are limitations to affect laboratory teaching/learning. This paper will contribute to the literature and practice by outlining the factors affecting science/chemistry laboratory education in Turkey and the relations between these factors. From qualitative research methods, document analysis was used to collect data and content analysis was used to analyse and interpret data (Yıldırım & Şimşek, 2003). The literature (journal articles, conference papers) about science/chemistry laboratory/experiment on

elementary, secondary, university, and teacher education levels was used as data source. In both the elementary and secondary school levels although classes are crowded and laboratories are not in a good condition in terms of equipment, space, and organisation, laboratory method is able to be implemented. The reason can be the teachers' rigid use of curriculum and textbook, because the curricula are student-oriented. Teachers aim to develop students' observation skills as well as reasoning abilities and manual skills. Teachers hesitate to use laboratory when they did not get enough experiences on laboratory lessons during in-service education, and were new in teaching and class management. They need in-service courses on laboratory. Students have positive attitudes toward laboratory, but physical structure of laboratory setting, inadequacies in materials science/chemistry laboratories in all levels are not parallel to the theoretical lessons. In teacher education level, students have positive attitudes toward laboratory and generally think that laboratory will help them learn the subject better, know laboratory materials and how to use them, transfer knowledge into real-life situation, gain study skills, develop self-confidence, and contribute to teaching job, but due to verification nature of laboratory applications, incongruence with theoretical lesson, and instructors' quality, basic facts and skills such as knowing and using laboratory materials and preparing solutions are not achieved. Both teachers' and students' attitudes toward laboratory are related to their epistemological beliefs on science and ideal laboratory. Curricular context plays an important role here, because it shapes learning/teaching experiences and all dimensions of scientific literacy should be given in harmony. Therefore laboratory method should employ nature of science or science as conveyor to knowledge dimension (Ministry of National Education; Chiapetta, Fillman, & Sethna; Lederman & Niess; Bou Jaude, as cited in Kılıç, Haymana, & Bozyılmaz, 2008) more by inquiry oriented activities so that it can motivate students and teachers, make learning durable and enjoyable, develop positive attitudes toward science/chemistry.

Keywords: Chemistry education, Laboratory, Turkey

EXPLORING INTERACTIONS AND RELATIONSHIPS AMONG TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE CONSTRUCTS VIA ROUGH SET ANALYSIS

Kemal Özgen, Serkan Narli

Teknolojik pedagojik alan bilgisi (TPAB) modeli, alan bilgisi (AB), pedagojik bilgi (PB) ve teknolojik bilgi (TB) olmak üzere üç farklı temel bileşeni ele almaktadır. Modelin genel kabulüne göre, bu bileşenlerin ikişerli arakesitlerinden pedagojik alan bilgisi, teknolojik pedagojik bilgi ve teknolojik alan bilgisi gibi üç bilgi alanı, üçlü arakesitinden de teknolojik pedagojik alan bilgisi bileşeni ortaya çıkmaktadır. Ancak bu arakesitlerin ilgili alanları ne derece belirlediği tartışma konusudur. Sunulan çalışma, AB, PB ve TB ile teknolojik pedagojik alan bilgisi arasındaki ilişkiye odaklanmıştır. Bu ilişkiyi yapay zeka, verilerin indirgenmesi, bağımlılıklarının keşfi, veri öneminin tahmini ve verilerden karar (kontrol) algoritmalarının oluşturulması gibi alanlarda kullanılan kaba küme kuramı yardımıyla, matematiksel netlik oluşturacak biçimde belirlemeyi amaçlamaktadır. Bunun için ilköğretim ve ortaöğretim matematik öğretmenliğinde öğrenim gören 340 öğretmen adayına TPAB ölçeği uygulanmıştır. Veriler, her alt faktör için düşük (D), orta (O), yüksek (Y) olmak üzere üç gruba ayrılarak kaba küme analizine uygun hale getirilmiştir. TPAB boyutunda herhangi bir gruba ait öğrencinin, potansiyel olarak diğer grupların hangilerine ait olabileceği belirlenmiştir. Düşük, orta ve yüksek grup olarak belirlenen kümelerin kesinlik dereceleri; , , olduğundan, bu kümelerin kaba küme belirttiği görülmüştür. Analiz sonucunda, AB, PB ve TB bileşenlerinin birlikte, TPAB' yi 0.105 bağımlılık derecesiyle açıkladığı ve herhangi bir bileşenin, tek tek önemlilik dereceleri düşük olsa da veri grubundan elenemeyeceği görülmüştür. Son olarak, AB, PB ve TB ile teknolojik pedagojik alan bilgisi arasında karar kuralları oluşturulmuştur.

Keywords: Content knowledge, Pedagogical knowledge, Technological knowledge, Technological pedagogical content knowledge, Rough sets

EXPLORING THE GRAPHS OF FUNCTIONS USING THE JIGSAW APPROACH

Vijayanthi Vijayan, Masitah Shahrill, Nor'arifahwati Abbas, Abby Tan

Cooperative learning is a strategy that involves students working together towards achieving a common goal. This learning technique can be carried out in various ways and one such method is by the jigsaw approach. In the jigsaw approach, students become experts in a particular concept and then share their knowledge with other group members. The purpose of this study is to investigate how effective the jigsaw approach is in improving students' performance levels in Mathematics, in particular, in the topic of graphs of functions. This mixed method action research study involves two cycles, conducted in two different local government schools in Brunei Darussalam. Cycle 1 involves a Mathematics class of 19 students and Cycle 2 with 25 students, and both at the Year 10 level. A pre-test and post-test design was used for this purpose. Students' perceptions on cooperative learning were also studied. The results of this study suggest that the jigsaw approach does have a positive effect on students' performance levels in Mathematics. Cooperative learning needs to be practiced more in classrooms as it helps in the development of 21st century skills for the students.

Keywords: Cooperative learning, Jigsaw approach, Secondary mathematics

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EXPLORING THE RELATIONSHIP BETWEEN PRE-SERVICE TEACHERS' MATHEMATICAL BELIEFS AND THEIR INITIAL TEACHING PRACTICES WITHIN REAL-CLASSROOM SETTING

Ümit Kul, Sedef Çelik

Over the past few decades, there has been much research on teachers' cognitive and affective variables such as beliefs, emotions, conceptions and knowledge as well as their relationship with teaching practice. This study has been conducted to explore the relationship between future teachers' mathematical-related pedagogical beliefs and their initial teaching practice in a classroom setting, in terms of how they design the content of teaching activities, they employed the style of teaching in mathematics, and they engaged with pupils. This study consisted of fourth year teachers' candidates who are enrolled in School of Education, Artvin Coruh University. A collective case study approach was used, in which future teachers were requested to complete open-ended evaluation form concerning a mathematical beliefs, and were then observed using a variety of procedures to reveal qualitative data about their initial teaching practice during the school-based practicum. The preliminary analysis of data revealed that most of the participants hold constructivist-oriented pedagogical beliefs about mathematics. The initial observation and field notes demonstrated that most pre-service teachers who have had a constructivist-oriented pedagogical belief teach utilizing contemporary approaches in mathematics teaching. However, some pre-service teachers held learner-based pedagogical belief, but did not integrate constructivist ideas into their teaching. It can be said that there is an inconsistency between teachers' mathematical-related pedagogical beliefs and their teaching practices. The paper presented some implications for teacher education programs and teachers' professional development.

Keywords: Pre-service teachers, Mathematical beliefs, Teaching practice, School-based practicum

FOR THE FIRST TIME IN TURKEY: BILMER PROJECT SCHOOL-SCIENCE CENTER COLLABORATION

Fitnat Köseoğlu, Eray Şentürk, Uygar Kanli

The purpose of the study is to introduce a project entitled with "Bilmer Project: A Model of Professional Development for Teachers and Explainers of Science Centers to enhance the Effectiveness of Science Centers in Science-Society Dialogue and Science Education" supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK) with its goals and theoretical framework. In 1990s, classrooms were began to be considered insufficient environments to enhance students' attitudes towards science as well as their understandings of science on their own. Most of the studies pointed out that science curriculums should be extended beyond the school walls to out-of-school environments such as science centers. However, it was determined that trainings towards how to integrate rich opportunities of science centers with school curriculums were not provided for teachers and explainers of science centers. Even any scientific investigations regarding this issue were not conducted in Turkey. To resolve this issue, Bilmer project was designed to investigate what kind of characteristics of a model of professional development should have to provide teachers, teacher candidates, and explainers of science centers with making connections between school curriculum and the opportunities of science centers. It was also aimed at evaluating the effectiveness of professional development programs that will be developed according to this model in this project through scientific investigations. Since about one year, the project team has been attempting to develop a model of professional development, which is appropriate to Turkey's conditions. The model has own characteristics such as theoretical framework. It consists of nine different themes, adopts modular type, attempts to provide an improvement in pedagogical content knowledge of teachers and explainers of science centers. In this model, it is especially focused on the development of desktop versions of interesting exhibits offered in science centers. By integrating them to science curriculums, creative and original teaching sequences including new teaching approaches such as inquiry-based learning are tried to be developed. In a pilot workshop of Bilmer project lasting thirty-six hours where experienced science teachers, explainers of science centers and academicians (n=55) participated, it was collected views of participators on the examples of teaching sequences through discussions. We think that these teaching sequences of which some examples will presented on the conference contribute to science education literature, and also they make interested group of people aware of how to utilize rich opportunities of science centers in science curriculums.

Keywords: Learning at science centers, Out-of-school learning, Teacher education, Training explainers, Science education.

FOREIGN LANGUAGE TEACHING WITH AUGMENTED REALITY APPLICATION

Niyazi Gündoğmuş, Gökhan Orhan, Ismail Şahin

One of the main aims in Foreign Language Teaching is to actualize natural and entertaining educational environment. Foreign Language Teaching Activities should stress on motivational goals furthering interests and motivation of learners and minimizing their anxiety in language teaching activities. So as to adopt that, these activities should be designed to incite students' interests and curiosity. The activities include some diverse alternatives from school textbooks to handheld technological devices and other electronic appliances. The alternatives for educational purposes may multiply in results of innovations and individual's access to technologies in surrounding educational environment. For the purpose, application of technological innovations and handheld technological devices should bridge the gap between real world and virtual world. In the study, a technological innovation called "Augmented Reality (AR)" is applied. The purpose of the study is to determine attitudes of learners towards Augmented Reality Application (AR) which enables learners to improve their listening skill and promote the motivation towards listening

training by using smart phones and tablets. The study focuses on AR assisted learning with listening training in school textbooks. Data collected from 60 students in a secondary school in Uşak by using the scale with 15 items "Augmented Reality Applications Attitude Scale In Secondary Schools". For this AR educational application, the three English Language teachers' opinion was consulted. It is assumed that the prototype of the AR educational system will enlarge students' motivation towards listening activities and listening competence and pave the way for a new teaching activity assisted with AR technology in foreign language teaching by shifting time and place of education and learning.

Keywords: Augmented reality application, Instructional design, Foreign language teaching, Listening

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FORMATIVE ASSESSMENT SYSTEMS FOR MATHEMATICS-USING MULTIPLE CHOICE QUESTIONS AS OPEN-ENDED QUESTIONS AND HOW DISTRACTORS CAN HELP ASSESS STUDENT'S COGNITIVE LEVEL

Evgenios Avgerinos, Athanasios Karageorgiadis

The advent of the assessment systems with the help of computer made the implementation of formative assessment methods possible. Formative assessment's goal is to help student improve his performance by discovering his knowledge gaps and misunderstandings. Although many formative assessment methods have proposed in recent times, they were difficult to implement because they require more teaching time. But, with the use of formative assessment systems is possible to overcome this obstacle. Most of this systems use multiple choice question to assess student's cognitive level. Even though multiple choice questions are often source of conflict about whether they are suitable to assess student's higher cognitive level, many recent publications support that fact. On the other hand, there is no similar conflict about open ended questions, but this type of questions is hard to be used by some formative assessment method because open ended questions take more time to be corrected. In addition, open ended question is difficult to be used by a formative assessment system for Mathematics and instead the use of multiple choice questions is preferred. Using multiple choice questions as open ended questions by such systems eliminates the possibility of the student to be able to guess the correct answer and to answer correctly by luck. In this paper such a use of multiple choice questions is proposed. Also, the use of the question's distractors for the assess of student's cognitive level by a formative assessment system in Mathematics is proposed. Depending on which distractor the student's wrong answer is closer, it is possible to assess student's knowledge gaps and misunderstandings on the question's mathematics topic. In conclusion, the above feature is able to give to an assessment system the ability to be adaptive.

Keywords: Assessment, Multiple choice questions, Formative, System, Mathematics.

FOSTERING MATHEMATICAL COMMUNICATION IN PRIMARY MATHEMATICS CLASSROOM: A STUDY ON CLASSROOM TEACHERS

Defne Kaya, Sertel Altun

Fostering mathematical thinking skills of children has become an important challenge for 21st century classrooms. It is widely recognized that higher order thinking skills such as problem solving, reasoning, analytical thinking, etc. are of preliminary importance for today' societies. Students need to engage in meaningful learning activities to develop these skills. Studies emphasized mathematical communication as

an important classroom activity to foster mathematical thinking skills (Brendefur & Frykholm, 2000; Franke et. al, 2009; Pape, Bell & Yetkin, 2003). Communication is also important for developing students' conceptual understanding, thinking, problem-solving and reasoning skills (Jung & Reifel, 2011). Creating a fruitful mathematical communication environment, where students express their ideas about their mathematical understanding, is also essential for keeping cognitive demands of students high. Scaffolding, modeling, self-monitoring and self-questioning are among factors to maintain the complexity of a mathematical task in classroom (Henningsen & Stein, 1997). Therefore, teachers have an important responsibility both designing high quality tasks and engaging students in fruitful mathematical communication. The purpose of the study is to enhance teachers' skills to create a mathematical communication atmosphere in their classrooms. Present study is a case study within a qualitative research design. Participants were two 4th grade teachers teaching in a private school in İstanbul in 2015-2016 academic year. Data were collected through semi-structured interviews and classroom observations. The study lasted four weeks and included pre and post interviews, meetings with teachers focusing on mathematical communication and classroom observations. Descriptive analysis was performed to analyze the qualitative data. After the implementation teachers indicate that mathematical communication is essential for fostering students' conceptual understanding and monitoring their thinking process. They look mathematical talk in classroom from a different perspective and want to use more strategies to enhance mathematical communication was also among their assertions. Data from classroom observations supported their views.

Keywords: Mathematical communication, Primary mathematics, Professional development

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FOSTERING PRIMARY SCHOOL STUDENTS' METACOGNITION USING PROJECT-BASED LEARNING

Milica Pavkov-hrvojević, Dušanka Obadović, Stanko Cvjetićanin, Ivana Bogdanović

Primary school students have difficulties in understanding the physical content due to insufficiently developed abstract reasoning skills and metacognition. Metacognition refers to the processes used to plan, monitor, and assess one's understanding and performance. It is "cognition about cognition", "thinking about thinking", or "knowing about knowing". Metacognition includes a critical awareness of one's thinking and learning, as well as awareness of oneself as a thinker and learner. There are three distinctive components of metacognition: (1) metacognitive knowledge, (2) metacognitive regulation and (3) metacognitive experiences. Since metacognition includes knowledge about when and how to use particular strategies for learning or for problem solving it is very important in learning physics. Project Based Learning can help fostering primary school students' metacognition. Project Based Learning enables students to gain knowledge and skills by investigating and responding to challenging question or problem. Since the projects are focused on student learning goals, including skills such as critical thinking, problem solving and self-management, while working on projects students must use metacognitive activities. Also project design includes that students make decisions how they work on a project and they reflect on learning, the effectiveness of their inquiry and project activities; they discuss the quality of their work, obstacles and how to overcome them. Because of that students benefit in respect of mentioned metacognitive components by the use of project-based learning. A proposal for the implementation of project-based learning to encourage metacognition will be presented in this paper.

Keywords: Metacognition, Physics, Project-Based Learning, Primary School

FRACTIONAL LITERACY LEVEL OF STUDENT MATHEMATICS TEACHERS

Ismail Şan

The purpose of this study is to determine the student mathematics teachers Fractional Literacy level. Survey method was used in this study. The sample of this study consists of 176 student mathematics teachers from Inonu University Faculty of Education, in Malatya, in 2016 spring semester. Data was collected by Fractional Literacy Test and personal information form developed by researcher. Findings show that, student teachers fractional literacy level is average. Based on this result, it can be recommended that, in teacher training process, lecturers should focus on activities that improve student teachers' fractional (mathematical) literacy.

Keywords: Mathematics literacy, Fractional literacy, Student teachers

FUTURE TEACHERS' KNOWLEDGE ABOUT EPIGENETICS: PERSISTENCE OF GENETIC DETERMINISM CONCEPTIONS

Boujemaa Agorram, Moncef Zaki, Sabah Selmaoui, Salah-eddine Khzami, Abdelaaziz Razouki, Assist Prof. Dr. Mustapha Arfaoui

In recent decades, Genetic issues play a large role in health and public policy and new knowledge in this field continues to have significant implications for individuals and society. In spite of this increased exposure to genetics, recent studies of the general public's genetics knowledge show a relatively low understanding of genetics concepts. Eepigenetics is a new paradigm in biology. Nevertheless, the notion of genetic determinism is still present in syllabuses and textbooks. The present research explores the future Biology teachers' conceptions related to the genetic determinism of human performances. The research method is a questionnaire elaborated by the Biohead-Citizen consortium. The findings revealed that future Biology teachers still reducing the biological identity to a genetic program. The set can also enhance the danger of hereditarian ideology and justifies the fatalism and racism. We concluded that the teaching of epigenetics becomes a scientific and citizen challenge.

Keywords: Genetic determinism, Future teachers, conceptions, epigenetics

FUZZY LOGIC BASED MCCARTHY LEARNING STYLE INFERENCE SYSTEM

Kadriye Filiz Balbal, Naciye Mülayim, Ali Özdemir, Ayşegül Alaybeyoğlu

In this study, a learning style inference system which is based on fuzzy logic technique and McCarthy learning style is developed to improve student success and learning in education field. McCarthy learning style classifies learners as Innovative, Analytic,Common Sense and Dynamic. In this study, a software system is developed and an interface which includes some questions in relation with McCarthy learning style is designed. Answers of the students are rated and given as an input to the proposed fuzzy logic

engine which has four inputs namely Innovative, Analytic,Commen Sense, Dynamic and an output namely EducationStyle. The proposed software system inferences Education Style, Learning Status and the Level of Learning Style of the student. By this way, the instructor will be able to match his teaching style with student's learning style which contributes to student's success in education field.

Keywords: Education, McCarthy, Fuzzy logic

GAINING PATTERN SKILLS IN EARLY CHILDHOOD MATHEMATICAL DEVELOPMENT

Feride Gök Çolak, Adalet Kandir

All daily activities of humans in their contemprory life is related with mathematics. According to research on early childhood mathematic education, daily activities require certain actions such as solving problem, one to one correspondence,patterning, classification and measurement. These concepts can be applied on advanced concepts such as ordering, patterning, modeling, connecting groups and symbols, perceptible data addition and subtraction. According to researches, improving mathematical skills is much based on early ages of childhood it is vital to improve mathematical skills at the early years. Pattern has an important role to discover and understand mathematical concepts, because skills of pattern is directly related with cognitive process functions. When national academic papers that have been related with this topic are researched, there are few papers that includes the topic of pattern skills in primary and higher educational positions. Also there are few papers that include researches that have done at preschool level about early mathematical educations however there aren't any researches on mathematical pattern development directly. The purpose of this paper is to examine gaining pattern skills development in early childhood mathematical development (by doing related literature researches.) Documentation analysis is used in this research. Additionally, following the purpose of paper; early childhood mathematical development, pattern concept of mathematical skill development, properties and gaining pattern skills topis are commented as well.

Keywords: Early childhood, Preschool education, Mathematic education, Pattern, Pattern development

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GAME PROGRAMMING TO ELIMINATE THE DIFFICULTIES IN LEARNING FOUR BASIC OPERATIONS

İnayet Hakki Çizmeci, Davut Alan, Şakir Taşdemir

The development of the technology affects all disciplines. Without doubt, one of these disciplines is education, which contributes to shaping our future. Referring to the studies made in education field, it is seen that researchers want to find an answer to the question of "How can we make a better instruction through developing technology?". As an answer to this question, tools like computers, tablets etc. are used as auxiliary tools in education. By using different software or applications developed for these tools, it is aimed to improve the performance in education. A kind of software that is developed for these tools is the game. The game is a concept which an activity of humans that they usually do willingly and tastefully in a specific time period and in a suitable environment and that results in the development of mental or physical skills. Because computer games are a kind of software, it brings a different characteristic to them compared to classical games. In the scope of this study, a game has been designed to eliminate the difficulties in learning four basic operations, which are the basics of the mathematics. This game is

designed by Scratch software which is one of the favorites of these days. Scratch is a software developing tool which helps young people to learn essential skills for life in the 21st century like thinking creatively, reasoning systematically and working collaboratively. This tool is developed in MIT Laboratories and distributed freely. The designed game consists of four different sections like addition, subtraction, multiplication and division. Game starts with the selected section by the user. There is a penguin that tries to eat fishes falling from above. Different colored fish fall from above according to selected mathematical operation. When the user answers the question that appears after the penguin eats colored fish correctly, he/she earns extra 10 points. The aim of the game is to get the maximum points. Total points got by user show the amount of how much user has learned the subject in a specific time. In addition, the game gives a mechanism for teachers to get feedback. With this educational game, it has been aimed the students to learn four basic operations easily and in an entertaining way.

Keywords: Computer game, Mathematics education, Scratch, fun learning.

GENDER DIFFERENCES IN CONSTRUCTIVIST APPROACH TO HIGH SCHOOL STUDENTS' COMPREHENSION OF ELECTROCHEMISTRY CONCEPTS

Kwaku Darko Amponsah, Chukunoye Enunuwe Ochonogor

This study reports on research findings on the effect of collaboration combined with text manipulation on male and female students' comprehension of electrochemistry concepts, in the Ximhungwe circuit of the Bohlabela district in the Mpumalanga province of South Africa. The theoretical frame work of this study is rooted in Posner et al's Accommodation of a Scientific Conception: Toward a Theory of Conceptual Change. This theory strongly proves that learning is a social process and communication facilitates learning. A sample of 47 12th grade physical sciences students from two public schools in the circuit was randomly selected to participate in the study. One of the public schools is a high achieving school (HAS) and the other is a low achieving school (LAS). Students were given electrochemistry concept test (ECT) and Chemistry Classroom Environment Questionnaire (CCEQ) as pre-test and post-test. After the treatment, ANCOVA conducted on posttest scores of the students showed that there was no significant mean difference between male and female students in their comprehension of electrochemistry concepts. Similarly, there was no significant interaction effect between gender and treatment. However, Pearson Product-Moment Correlation revealed that there was significant relationship between achievement and students' perception of their chemistry classroom environment. It was concluded that collaboration combined with text manipulation was equally effective for both males and females.

Keywords: Collaboration, Conceptual change texts, Electrochemistry, Gender, Social constructivism

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GESTURES OF HEARING-IMPAIRED HIGH SCHOOL STUDENT ON DESCRIPTION PROCESS POLYGONS AND PROPERTIES

Nejla Gürefe, Ahmet Arikan

In this study, it was investigated how a hearing-impaired student defined polygon concept and what this student used gestures in this description process. This research was carried out by three students selected from deaf students high school in Ankara during 2013-2014 academic year. But, in this study, one student's data were considered. Grounded theory techniques (open coding, axial coding and selective coding) and

semiotic bundle approach were used to analyze the data collected via interviews, observations, and documentation reviews. It was determined that student defined polygon concept explaining polygon shapes and non-polygon shapes and used oral expression, sign language, gesture and inscriptions in this explaining process. By this study, especially, used gestures for concepts were examined. The gestures of student were accompanied sometimes orally (limited speech) and sometimes sign language. Analyzing the language that accompanied the gesture was possible with semiotic bundle approach (gestures, sign language and inscriptions and relationships between these components). It was observed that this student expressed two-gon as non-polygon shape and triangle, rectangle, square, rectangular, pentagonal, hexagonal, octagonal as polygon shapes and explained these concepts with gestures. Student explained that all polygons had angle and edge, without use edge concept, this student used "pi, ray and line" for edges in triangle, "line" for edges in square, pentagonal, hexagonal and octagonal, "line segment" for edges in square and rectangle. However, student expressed that triangle, square, pentagon, hexagon and octagon had point and explained angle, edge and point numbers in polygons. Student utilized point number in corner of shapes while he was entitling pentagonal, hexagonal and octagonal.

Keywords: Polygon, Gesture, Sign language, Semiotic bundle, Hearing-impaired.

GPSS TOOL FOR STUDENTS IN STATISTICS EDUCATION

Ecem Iren, Serdar Korukoğlu

Today, using of existing software and techologies becomes important in education and training. Academic institutions need various educational software tools which are appropriate for their own academic standards, curriculums and assessment tools. Those tools make lectures more clearly, enjoyable and concretely. Therefore they help students understand content of lectures by showing real results with graphics or tables. In the study, to take attention importance of mentioned tools, it is aimed to give a recommendation for statistics education. Many of statistics tutorials are taught in theoretical form in universities. While exercising statistical problems related to theoretical topic with students, some special tools should be applied for analyzing statistical formulas and their results. One of these tool is GPSS (General Purpose Simulation System) which is a software high powered general purpose computer simulation environment, designed for simulation professionals. It is a comprehensive modeling tool covering both discrete and continuous computer simulation, with an extremely high level of interactivity and visualizability. At this point, GPSS tool is introduced and its benefits are explained in terms of its operations supplied to users. Also, Kolmogorov-Smirnov normality test is applied and implemented in the paper.

Keywords: Statistics education, GPSS tool, Improvements in statistics education, Kolmogorov-Smirnov test

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GRADUATE STUDENTS' VIEWS ABOUT THE SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) EDUCATION

Fethiye Karsli, Koray Kocaman, Yasemin Hacioğlu, Çiğdem Şahin

Recent researches in the field of science education emphasized that importance of interdisciplinary science education and integration of the Science, Mathematics, Technology and Engineering (STEM) education support one another. In this context countries renew their science education standards. In Turkey has similar educational goals. But, it is seen as a necessity of integration of disciplines the STEM and practices, when examined the skill, affective, science-technology-society-environment learning domain of the science programme. So, in our country the STEM education approach should be adopted and the STEM practice should be done at the schools. So improving an understanding with the STEM education approach of teachers is important quietly. Thus, the STEM education approach is new in Turkey. In this parallel, young science education researchers should develop an positive understanding on the STEM education for improving of the STEM education practices, especially. But, it is not known young science education researchers' views about the STEM education. In this context, the aim of this study was to determine graduate students' views about the STEM education. The methodology of this study is case study. The sample of this study consists of 15 graduate students who had graduated from the faculty of education and continuing their studies in the department of science education in the science institute of two universities in North Coast of Turkey in 2015- 2016. To gather data, semi-structured interviews with 10 open-ended questions were used. Each interview lasted almost 50 minutes. The data were analyzed by content analysis. In analyzing the data "understanding of the STEM", "Positive and negative views about STEM education", "hesitate to implementation the STEM education" and "suggestions to implementation of the STEM education" categories were created. To evaluate the students' descriptions, one chemistry and two science educator independently separated categories for graduate students' responses and the interrater reliability coefficient (Cohen's Kappa) between the re¬searchers was found to be 0.85. Quotations from the graduate students' expressions were presented to ensure the validity of the data. At the end of the research, it is found that graduate students had insufficient understanding on the STEM education in spite of had generally positive views. hesitate to implementing of the STEM activities in science classes. Also graduate students have hesitates to implement the STEM activities, but have some suggestions for implementation of the STEM education.

Keywords: STEM education, Graduate students, Case study

GRADUATE THESIS ANALYSIS BASED MADE EFFORTS TO FATIH PROJECT: THE SAMPLE OF YOK DATABASES

Habib Özgan, Asim Barut

The purpose of this research is to make a comparative analysis of the graduate thesis, made under the Fatih Project. Research data from graduate thesis written between the years 2014-2015 and YÖK (Higher Education Council of the National Thesis Center) is limited to data obtained from the database. Qualitative research approach was adopted and the data obtained by the research conducted document analysis. The data were analyzed using content analysis. According to the results obtained from the research findings; While there is generally a positive attitude about the interactive whiteboard, it has been found to be inadequate use of tablet computers. Technological problems, as well as the contents of the missing teachers Fatih project, and that the technology they need to provide educational and vocational training services in the use of aspects, one of the important findings of this study.

Keywords: Fatih project, Interaction smart board, Educational technology

HAAR WAVELET OPERATIONAL MATRIX METHOD FOR SOLVING DIFFERENTIAL EQUATIONS BY MAPLE CODE

Pinar Kalin, Murat Akkuş, Yildiray Keskin

Computer algebra systems have begun to replace procedural programming as the tools of choice for engineering problem-solving. These tools offer ease-of-use along with sufficient computational power to solve real-life problems. In this paper, a general framework of the Haar wavelet operational matrix method is presented for solving the ordinary differential equations with computer algebra systems. In addition, two test problems of illustrate the effectiveness and the performance of this method. Finally, a maple program is prepared to solve ordinary differential equations by Haar wavelet operational matrix method.

Keywords: Haar wavelet, Operational matrix method, Differential equations

HARNESSING THE POWER OF SOCIAL MEDIA IN ACADEMIC ENVIRONMENT

Naciye Güliz Uğur, Aykut Hamit Turan

The issue of retention is a global problem with implications for individuals, businesses, and academic organizations. Customer retention is a key factor for fiscal success and competitive advantage in a global economy. In addition, applying communication and relationship-building techniques is a common practice to increase customer loyalty and retention. Although retention is crucial to the economic success of an educational institution, higher education administrators often ignore quality customer relationship management as a solution for retention. In order to remain financially viable, higher education administrators needed to place a greater focus on customer retention. As college and university retention officers attempt to retain students using classic programs and models, many students have shifted their methods of communication to more interactive, self-created content used to position individuals as members of groups. Researchers have demonstrated the importance of active, two-way communication in the customer relationship management and customer retention processes. Findings from this study may contribute to the existing body of knowledge regarding the potential relationship between customer retention and social media. Furthermore, the results of this study might provide guidance for both business and academic leaders to improve customer loyalty efforts and increase competitive advantage, thereby influencing long-term profits by reducing customer attrition.

Keywords: Social media, Facebook, Customer retention, Student retention, Empirical resarch

HIGH SCHOOL STUDENTS' ASSOCIATING STATUS WITH DAILY LIFE EVENTS OF DISSOLUTION AND DIFFUSION CONCEPTS

Fethiye Karsli, Çiğdem Şahin

The aim of this study was to determine the high school students' status of associating with daily life events of dissolution and diffusion concepts. The study was carried out in the form of a case study one of the qualitative research methods with 54 (30 girl and 24 boy) 9th grade students in a high school in North Coast of Turkey. As data collecting tool, "the form of Associating with Daily Life" including "dissolution and diffusion" concepts was used. The form consists of 22 different open-ended questions related with daily life events. Also it consist of a section which there are questions for students' writing the causes of events about the "dissolution and diffusion" concepts and which can be explained with science concepts. The form was applied to the students in 30 minutes. The data were analyzed by content analysis. In analyzing the data "Correct Reason", "Partially Correct Reason", "Reason with Alternative Conception" and "Wrong reason" categories were created. To evaluate the students' descriptions, one chemistry and one science educator independently separated categories for student responses and the interrater reliability coefficient (Cohen's Kappa) between the re-searchers was found to be 0.90. Quotations from the students expressions were presented to ensure the validity of the data. At the end of the research, it is found that students had difficulty when associating between the dissolution and diffusion concepts and daily life events. In addition, it is seen that students had some alternative concepts in explaining the daily life event: (1) resulting from confused of dissolution and diffusion concepts and (2) resulting from confused of dissolution and diffusion concepts with other science concepts.

Keywords: Dissolution, Diffusion, Associating with daily life, Alternative concepts, High school students

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HOW DO PRESERVICE ELEMENTARY TEACHERS PLAN AND PERFORM SCIENCE TEACHING?

Nurcan Cansiz, Mustafa Cansiz

This study aimed to investigate how preservice elementary teachers plan teaching science to elementary third and fourth grade students. For the purpose of this research, thirty preservice elementary teachers (PETs) prepared lesson plans and experienced microteachings. PETs were allowed to choose the methods of teaching science on their own. They selected an objective from the national science curriculum of 3rd and 4th grades and planned their lessons. Then they performed teaching in front of other PETs and an instructor. The data analysis was conducted using their lesson plans. Their microteachings were used for data triangulation to explore whether they really enact what they plan. The results revealed that PETs mostly used analogy, problem based learning, creative drama, in addition to lecturing. The ones planning their lessons using analogy, problem based learning, creative drama performed accordingly. However PETs who decided on lecturing as a teaching method did not use it solely rather they performed student-centered in-class activities.

Keywords: Elementary science education, Elementary teachers

HOW PRE-SERVICE PRIMARY TEACHERS VALUE REFLECTION?

Kader Bilican

It is argued that reflection lead better and responsive teaching and teachers who are reflective in nature are more likely to apply newly learned strategies in their instructional planning (Hanuscin & Lee, 2009; Akerson, Donlley, Riggs, & Eastwood, 2012; Akerson, Cullen, & Hanson, 2010). Therefore it is important to engage teachers in the practice of reflection to ensure recent educational reforms. Thus, the aim of the study was to explore how primary teachers practice "reflection" over a science laboratory course. The sample of the study was consisting of 18 junior primary teachers enrolling science laboratory course. The laboratory course was an inquiry driven course including laboratory tasks related to basic science content and science process skills. Data was collective by means of qualitative data techniques. Open-ended questions were added to the laboratory sheets which participants were responsible to fill in at the end of the each laboratory session. These laboratory sheets were designed specifically enabling participants to reflect on the task in each session. Six of these sheets were used as a data source. Additionally, interviews with six participants were conducted at the outset of the study. Findings revealed that participants were more keen to reflect on the task they were doing towards the end of the laboratory course. Moreover, the participants value reflection as a tool to evaluate and monitor their own learning. Implications of the study will be made in longer manuscript.

Keywords: Reflection, Primary teacher education

HOW TO IMPROVE SCIENCE TEACHERS CONFIDENCE IN TEACHING: THE EFFECTS OF PERCEIVED CAREER SATISFACTION AND PROFESSIONAL COLLABORATION

Ibrahim Delen, Mehmet Şükrü Bellibaş

The purpose of the present research is to examine the relationship of science teachers' career satisfaction and professional collaboration to their confidence in teaching science. The data employed in this study was obtained from Trends in International Mathematics and Science Study (TIMSS), administered by Organization for Economic Cooperation and Development (OECD) in 2011. The linear regression model based on OLS assumptions was used to analyze the data. The results indicated that science teachers' both career satisfaction and professional collaboration are significantly associated with their confidence in teaching science. Among all controlling variables, only student socio-economic background and school location were significant predictors of teachers' confidence.

Keywords: Teacher education, Job satisfaction

IDENTIFICATION WITH FUTURE MEDICAL PROFESSION AND COMMUNICATION SKILLS AMONG PHYSIOTHERAPY STUDENTS

Mariusz Jaworski, Miroslawa Adamus

The level of identification with the future professional role is an important factor which affects the development of professional competence in medical students. Communication skills are the main competences in medical students. These competencies allow to conduct the proper clinical interview, and also the diagnosis and choice of appropriate therapies. The aim of this study was to analyze the relationship between the level of identification with the future professional role and perception of communication skills among physiotherapy students. Participants were 58 students of physiotherapy, ranging in age between 20 and 24 years old (average age = 21.0). Two research tools were used in study: Scale Identification with Future Professional Role (Adamus and Jaworski) and Scale of Communication Skills. SPSS 21 was used to statistical analyzes. The students were characterized by a high level of identification with the future professional role. In addition, it was observed that the assessed level of communication skills have a positive relationship with the global level of identification with the future professional role as well as its dimensions - task-oriented and theoretical dimension. These two dimensions are necessary for the complete identification with the professional role, but they have different effects on the realization of this role. The first one is intuitive and emotional, and the second - rational. Regression analysis have showed that the level of identification with the future professional role explains the 32.6% of evaluated communications skills level. Actions enhancing communication skills of physiotherapy students could contribute to their greater identification with the profession and vice versa. The level of identification with the medical profession - in this case with physiotherapy - shows a positive correlation with subjective assessment of communication competence. The presented results suggest the need to reinforce forming the abilities of communication skills in the curriculum of physiotherapy.

Keywords: Identification, Medical profession, Communication skills, Physiotherapy

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IDENTIFYING CONSTRUCTS OF WEBQUEST LEARNING AS PERCEIVED BY PROSPECTIVE ELEMENTARY TEACHERS THROUGH DESIGN PROCESS

Meriç Özgeldi, Ilker Yakin

The aim of this study was to explore prospective elementary mathematics teachers' perspectives on WebQuest learning through the design of topics in elementary mathematics. The data sources included prospective teachers' written responses to the assignments developed for forming their opinions and understanding how they perceived the WebQuest learning process. 48 prospective teachers were participated in this study. Participants' written responses were analyzed according to three underlying constructs of WebQuest learning affecting teachers' perceptions (i.e. constructivist problem solving, social interaction, and scaffolded learning) identified by Zheng, Perez, Williamson, and Flygares (2007). While designing WebQuest, findings revealed that most of the responses addressed making real-life connections in WebQuest learning. Moreover, prospective teachers were aware of the importance of transferring knowledge from different fields (art, science, and architecture etc.), developing better interpersonal and small group skills, and facilitating mathematical content comprehension. Major themes and subcategories related to three constructs of WebQuest learning will be identified in the final version of the paper.

Keywords: WebQuest learning, Elementary mathematics, Desing process

IMPACT OF A CONSTRUCTIVIST APPROACH TO LEARNING ON HIGH ACHIEVING STUDENTS' COMPREHENSION OF ELECTROCHEMISTRY CONCEPTS

Kwaku Darko Amponsah, Chukunoye Enunuwe Ochonogor

This paper is part of a larger study to investigate 'The impact of a constructivist approach to learning on physical sciences students' comprehension of electrochemistry concepts' in the Ximhungwe circuit of the Bohlabela district in the Mpumalanga province of South Africa. The study explored the impact of using a constructivist type of teaching intervention – collaboration combined with conceptual change texts, termed conceptual change teaching strategy (CCTS) on students in high achieving schools (HAS) in their comprehension of electrochemistry concepts. The study utilized non-equivalent pre-test and post-test group control quasi-experimental research design. The theoretical framework for this study was based upon Vygotsky's social constructivism theory, which he defines as a sociological theory of knowledge that applies the general philosophy of constructivism into social settings. A sample of 51 12th grade physical sciences students from two high achieving public schools in the circuit was randomly selected using a table of random numbers to participate in the study. Students were given electrochemistry concept test (ECT) and Chemistry Classroom Environment Questionnaire (CCEQ) as pre-test and post-test. One way between group analysis of covariance (ANCOVA) and post hoc analysis with a Bonferroni adjustment conducted on ECT showed that students taught with the CCTS had significantly better acquisition of scientific conceptions related to electrochemistry than students taught with the traditional teaching method (TTM). Pearson Product-Moment Correlation also revealed that there was significant relationship between achievement and students' perception of their chemistry classroom environment.The study provides statistical evidence on the importance of meaningful learning combined with social process to improve students' understanding of electrochemistry.

Keywords: Collaboration, Electrochemistry, High achieving schools, Social constructivism, Traditional teaching method

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IMPACT OF SINGLE-SEX MATHEMATICS CLASS ON THE TEACHER INSTRUCTION

Murat Akkuş, Nesrin Özsoy

Single-sex education refers to the educational atmosphere that consists of only a single gender, either all-male or all-female (NASSPE, 2008). Males and females actually prefer such different educational experiences and subject matter that they are educated separately (Cohen, 2000). Although there has been a number of research conducted on single-sex education, a very limited portion of these research efforts focus on the interplay between gender and teacher instruction. The current study will focus on teachers' instruction in single-sex math classrooms. This research aims to collect data that focus on single-sex education as a strategy for increasing effectiveness of teacher instruction and student success in single-sex classrooms. The study will include two different types of classes. One of the classes is an all-girls class and the second one is an all-boys class. Efforts will be made to select at least two different teachers for each classroom type. Researchers will use six different instruments: field notes, video and audio recording and transcripts of videos, classrooms observation and teacher interviews. Understanding the single-sex classroom effect on teachers' instruction may better prepare teacher educators to support pre-service teachers. This research may also affect the professional development programs of in-service teachers who want to teach in single-sex classroom.

Keywords: Single-sex education, Teacher instruction, Mathematics education

IMPLEMENTATION OF DEVELOPED STEM ACTIVITIES IN SCIENCE COURSES

Fulya Konca, Güliz Aydin

The purpose of this study is to introduce the activities prepared according to STEM (Science, Technology, Engineering and Mathematics) approach in "Force and Energy" topics and to provide information on the implementation processes of these activities. STEM education is an interdisciplinary approach that provides practical and relevant learning experience for students. The study group of the current study was 27 seventh grade students studying at a secondary school in Aydın province during 2015-2016 academic year. Students conducted the STEM activities in groups for 6 weeks. The researchers prepared 8 activities according to STEM approach and based on researching and questioning for "Force and Energy" units. After that activities were done pre-application. This way, STEM activities are ready for classroom application. The titles of the applied activities were: "Mass Weight Relationship and Bridge Construction", "Solid Pressure", "How can We Irrigate Crops", "Our Mission to Hit the Target", "Wheel Turning with Water", Scroll Ball Racecourse Construction", "Moving vehicle with Balloon", "Moving Marine Vehicle with Balloon". Before the implementation of the activities, groups were provided with worksheets and materials that may be needed to create designs. Students were asked to do the activities in the activity worksheets. In each activity, the students are required to design for a particular purpose as a group. After they were asked to construct their design, test it and were asked to answer the questions in the worksheet as a group. In order to help students to have an in depth knowledge on the topic, they were asked to pass to the next stage in which there was a new research question. Students were not instructed for the designs they would prepare in the activity implementation process but theey were only provided with guidance. In doing so, the aim was to enable students to think with their friends in their group, to discuss and take a common decision, to research and question as a group, and to use such cognitive skills as creativity. The development of each activity and its implementation in the classroom are shown in detail in the study. Activities related to STEM approcach in this study are thought to lead for the classroom implementations to the researchers.

IMPROVING PROSPECTIVE SCIENCE TEACHERS' INTEGRATED STEM TEACHING COMPETENCIES

Serhat Ercan

STEM education can be identified as an integrated teaching approach towards STEM disciplines. It is obvious that this type of education requires different competencies rather than domain specific education. For instance, integrated STEM teaching requires extended content knowledge in comparison to teaching separate disciplines. Additionally, integrated education necessitates distinctive pedagogical strategies and tools. Teachers are educated to teach separate disciplines in current teacher training programs. They specialize in their own subjects. As a consequence, integrated STEM disciplines may seem difficult for them. As in every educational reform movement, "teacher" is one of the most critical elements for STEM education. For the success of STEM education, teachers' competencies related to integrated teaching should be developed. The current study investigated the efficiency of a professional development model which was developed to promote prospective science teachers' pedagogical competencies related to integrated STEM teaching. A qualitative paradigm was used in this study, which was lasted for 14 weeks. Nine prospective science teachers participated into the educational implementation. Participants have developed several integrated STEM teaching lesson plans during professional development activity. These

lesson plans have been used as a primary data source for the study. Collected data were analyzed by using constant comparative method. The analysis of data indicated that the professional development model was effective in promoting the prospective science teachers' pedagogical adaptation towards integrated STEM teaching.

Keywords: STEM education, Integrated STEM teaching competencies, Prospective science teachers

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IMPROVING THE LEARNING BEHAVIOR BY DESIGNING PROTOTYPE METHOD AT GEOTECHNICAL ENGINEERING EDUCATION

Mehmet Inanc Onur, Mustafa Tuncan, Burak Evirgen, Ahmet Tuncan

Civil engineers deal with planning, designing and construction steps of all structures such as building, highway, railway, dam, retaining wall and etc. Therefore, civil engineering education in bachelor degree includes geotechnics, hydraulics, material science, mechanics, structure, construction management and transportation engineering educations. Geotechnical engineering is interested in design, analyze and application of soil structures such as foundations, retaining walls, slopes and deep excavations as well as determination of soil properties. Students have to prepare a bachelor degree thesis for graduation in Anadolu University, Department of Civil Engineering. Students are asked to develop a prototype model about their subjects in geotechnical division. In this study, effects of developing prototype models in the geotechnical engineering education are researched. End of the study; observed improvements on the learning behavior are presented.

Keywords: Civil engineering, Geotechnical engineering, Improving the learning

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INTEGRATING STEM INTO EARLY CHILDHOOD EDUCATION: IS IT FEASIBLE?

Eng Tek Ong, Aminah Ayob, Md Nasir Ibrahim, Mazlini Adnan, Jameyah Shariff, Prof. Dr. Noriah Ishak

This paper aims to determine the feasibility of integrating STEM into the early childhood education. As such, a survey design was deemed appropriate. Purposive sampling technique was used in which 22 early childhood teachers from 19 urban and rural childcare centres in Malaysia were selected for this study. These 22 early childhood teachers were familiarised to the use of Problem-Based Inquiry Learning (PIL) in integrating STEM by means of 10 authors-developed STEM Projects through a three-day fully residential training workshop. Upon the completion of the training workshop, the teachers were supported in integrating STEM in their respective classrooms for five-month duration during which, an implementation of a maximum of five STEM Projects was aspired. Two sources of data were gathered from the teachers to determine the suitability of STEM integration in early childhood education: (1) at the end of the training workshop where teachers reported on the suitability of the STEM Projects for early childhood pupils aged 3 to 4+, and (2) at the end of the five-month classroom implementation where teachers reported on the STEM Projects which they have carried out with their 3-4+ year-old children. Findings indicated that, while two of the 10 STEM Projects were perceived as less appropriate by at least 50% of the teachers, eight other STEM Projects were deemed as appropriate. The actual implementation of STEM Projects among the teachers ranges between 60% to 100%, with a mean of 81%. This paper ends with a discussion on the characteristics of the appropriate STEM projects for 3 to 4+ year olds, and equally, implications for STEM education are proffered.

Keywords: Project-based inquiry learning, STEM education, Early childhood education

INTEGRATING TECHNOLOGY INTO PRIMARY AND SECONDARY SCHOOL STEM TEACHING

Zsolt Lavicza

Technology is increasingly becoming an important part of STEM teaching and learning in the 21st Century. There have been numerous attempts to integrate technology into education systems, but without serious development and research the success of these attempts had been limited. In my talk, I will highlight the importance of research and developing trials in technology-supported education and describe related projects. But, most importantly, I will outline the work that we are doing with colleagues in the Geomatech project in Hungary. Geomatech (http://geomatech.hu) is a large scale EU funded project, which aimed to develop high-quality teaching and learning materials for all grades in primary and secondary schools in Hungary. These materials (1200+ Mathematics, 600+ Science) is being embedded into an on-line communication and collaboration environment that can be used as an electronic textbook, a homework system, and a virtual classroom environment. In addition to material development, we offered 60-hour professional development courses for more than 2500 teachers in 950 schools in Hungary. Furthermore, we organized a wide-range of teacher and student activities including competitions, maths and science meetings, and developed a network of schools for the long-term sustainability of the Geomatech project. We believe that this project became a test bed for future international projects and trialling ground for different educational activities. After introducing the Geomatech project we will work with some of the available resources, trial mobile sensor experiments, and discuss their possible applications in Turkey and related research activities.

Keywords: STEM education

INTEGRATION OF THE SCIENCE CURRICULUM WITH ENTRAPRENEURSHIP IN ELEMENTARY SCHOOL

Sedat Uçar

Recent studies shows that students do not prefer to take science courses if those courses are not mandatory. As a result of that a shortage in science related professions appears in many countries. Many strategies have been proposed to overcome this problem all over the world to develop more positive attitude toward science and science related jobs. Countries still are in search of innovative strategies to promote science education. A new approach in teaching science through entrepreneur mindset could be a promising method to teach science for all grade levels. A document called "Entrepreneurship Education at School in Europe, National Strategies, Curricula and Learning Outcomes" produced by the Eurydice Network provides information on policies of 36 EU countries in teaching entrepreneurship practices. The document showed that eight countries integrated entrepreneurship education in science classes during general lower secondary education, only four countries integrated entrepreneurship education in science classes during general upper secondary education. The trend shows that there will be more countries integrate entrepreneurship in school science curriculums. The purpose of the current study is that to investigate the new Turkish science education curriculum (grade 3-8) to identify the level of integration with entrepreneurship. Results show that there are some standards which promote the entrepreneurial science teaching in higher grade levels. Detailed discussion and implementation will be presented.

Keywords: Science education, Entrepreneurship

INTERACTIVE WHITEBOARD USE IN EDUCATIONAL ENVIRONMENTS: RESEARCHS AND TRENDS

Mustafa Tevfik Hebebci, İsmail Çelik, İsmail Şahin

Rapid changes and developments in technology have a direct effect on education and instruction, as on many areas. This influence requires more effective learning environment and to train more qualified students. Making effective learning environments and the use of recent teaching materials offer a lot of convenience for educators. Today, one of the most useful materials is interactive whiteboard that was used in UK firstly in the beginning of 1991. Interactive whiteboard working connected to a computer and projector is a technological tool that provides to use the interactive learning content projected on a flat ground. In Turkey, studies about the use of interactive whiteboards (provided in the FATIH project launched to increase opportunities for teachers and students) are popular among researchers. The aim of this study is to reveal the trends on research for the use of interactive whiteboards in Turkey by examining the master and doctoral theses in National Thesis Center of the Council of Higher Education (CoHE) and thus to shed light on new studies to be conducted in the future. For this purpose, using keywords related to the use of interactive whiteboards, 49 theses have been reached as a result of searching through the National Thesis Center in CoHE. The results of the research revealed that purposeful sampling has been preferred in the theses and these are written in Turkish mostly. Another finding in this study is that quantitative and mixed methods have been used more than qualitative methods. Interviews, academic achievement tests, scales and surveys have been preferred by researchers for data collection in the theses widely and that data have been analyzed by quantitative methods. Even though researchers have utilized statistics such as frequency, percent, mean, t-test, and ANOVA for analyzing data, advance methods like MANOVA and MANCOVA have not been used.

Keywords: Interactive whiteboard, Smartboard, FATIH project, Technology

INTERNATIONAL DOCTORAL STUDENTS' EXPERIENCES OF PROFESSIONAL DEVELOPMENT IN A SOUTHEASTERN URBAN UNIVERSITY OF UNITED STATES

Azhar Qureshi, Kadir Demir

In this global age of higher education, the changing demographics of science students at advance levels demands new transformative pedagogies and practices by science faculty to address the issues of diversity and multiculturalism etc. The professional development practice requirements of doctoral students in science discipline are also not as identical as in the other discipline but its more multifaceted and based on many incidental factors. The purpose of this study was to understand science students' transformation practices and their professional development experiences as doctoral students. This paper is based on auto ethnographic methodology and attempted to explore their learning styles through their self-reflective practices. In this study, researchers purposefully selected three international doctoral students who are with diversified cultural backgrounds and were allowed to use their theoretical lenses to identify their transformational practices and experiential knowledge in getting doctoral degrees in science disciplines. The effort here was to infuse the tents of their reflective professional development experiences with the conceptual framework of effective professional development practices. The descriptive qualitative data obtained from these doctoral students were codified through three stages of initial, axial and thematic coding. By synthesizing themes with literature and infusing them with the tents of reflection and reflective practices, the authors has developed a collection of transformational elements that help in building their broader framework for effective professional development. These findings of the study also indicated that transformation of professional development practices required an analysis of structural, cultural and interpersonal aspects of institutional practices. The insights gained from their reflective auto-ethnography can encourage science faculty to alter their perspectives and be sensitive to the range of experiences doctoral students confront.

Keywords: Experiential learning, Professional development Practices, Doctoral students

INTERNET USAGE AMONG RETIRED PERSONS: HABITS AND PERCEPTIONS

Fatih Süleyman Biçer, Mustafa Koç

Rapid developments and diffusions of information and communication technologies (ICT) support human power with machine power and thus increase living standards in numerous fields such as housing, nutrition, education and health. Therefore, the increases of elderly population in the society and their problems have also increased research interest germane to these issues. This cross-sectional study explored retired persons' levels, purposes, and perception of Internet usage and the relationships between their usage and some demographic characteristics. It was designed as a correlational survey research. The population of the study comprised those retired persons living in the Isparta city center in Turkey. Regarding the sample of the study, 109 informants (77 male and 32 female) were recruited through visiting mosques, coffee houses, vocational lodges, and residential services where retired people exist intensively. The data were collected by means of a questionnaire with two parts. The first part included questions related demographic information (e.g., gender, educational level, retired profession) and the second included questions related to Internet usage profiles (e.g., frequency, experience, purpose of usage, location of connection) and perceptions. The results showed that most (70%) had a computer and a little more than half (55%) had an Internet connection at home. Almost 40% of the participants were Internet users spending 11.5 weekly hours on average and they connect to the Internet mostly at home or through mobile devices. The dominant purposes for their usage were to get general information and to follow social networking sites. Participants indicated the complexity of Internet usage, security problems, and lack of supporting person for their usage as the most important barriers to Internet usage. They sufficiently perceived both positive impacts of the Internet as wells as negative consequences due to its unconscious consumption. As far as demographics were concerned, time spent online differed significantly in terms of educational level whereas it did not differ by gender and retired profession.

Keywords: Retired persons, Internet usage, Perceptions, Demographic characteristics, Survey

INTRODUCTION AND ASSESSMENT OF THE FORMATIVE ASSESSMENT STRATEGIES APPLIED IN SCIENCE COURSES IN MIDDLE SCHOOLS

Nermin Bulunuz

Formative assessment is a teaching method that helps to determine the prior knowledge of students, schedule the course plan accordingly, give it the final shape based on the feedback received from students, and encourage conceptual learning. The aim of this study is to introduce the formative assessment strategies used in science courses in middle schools and to evaluate the practices that have so far been carried out. Within the scope of this study, the formative assessment strategies such as annotated student drawings, agreement circles, concept cartoons, concept card mapping, P-E-O Probes, and familiar phenomenon probes were used. The study was conducted during the classes of two science teachers who are doing a master's degree. In total, 114 students participated in the study from 5th, 6th, and 8th grades. Student drawings, concept maps, and the interviews with teachers and students were used for data collection. The data collected indicated that the formative assessment strategies are fairly effective in uncovering the prior knowledge of students and increasing their active participation in class. Additionally, it was determined that formative assessment practices arouse the interest of students, encourage them to learn, and contribute to the improvement of their questioning skills by increasing their school achievement.

Keywords: Science education, Formative assessment strategies, Conceptual understanding

INVESTIGATING LEBANEESE GRADE SEVEN BIOLOGY TEACHERS MATHEMATICAL KNOWLEDGE AND SKILLS A CASE STUDY

Nawal Abou Raad, Hanadi Chatila

Generally in science education, presentations that include both visual and verbal information are widely used in textbooks, to display instructional material (Cook, 2006). Quantitative graphs, presented frequently in biology textbooks, are considered as visual presentations. They display data and process complex information by presenting multiple relationships and processes that are often difficult to describe, to promote an understanding of the abstract scientific phenomena (Kozma, 2003). This paper investigates Lebanese grade 7 biology teachers' mathematical knowledge and skills, by exploring how they explain a visual representation in an activity depending on the "Function" concept. Eighteen Lebanese in-service biology teachers participated in the study, and were interviewed about their explanation plans for the designed activity. The analysis of data reveals that teachers refer to different entities as constituting models, express different way far away from the mathematical concept "Function". Based on our data, the findings could not be generalizable to all biology teachers, but we think it would be enriching for students if biology teachers have a background in mathematics and mathematics education , so they would be able to deal with situations of exploration and analysis of the different constraints that might affect biology activities. In addition, the results highlight the need to review the Lebanese Biology curriculum in order to include explicitly all the mathematical competencies required to build up the scientific knowledge.

Keywords: Quantitative graphs, Function, Biology teachers

INVESTIGATING OF ATTITUDE, BEHAVIOUR AND SELF- EFFICACY RELATED TO SCIENCE TEACHER CANDIDATES' RENEWABLE ENERGY AND ENVIRONMENT

Aysel Aydin Kocaeren

Environmental education can be defined as raising environmental consciousness among every segment of society, bringing for the awareness to environment-friendly, permanentand positive behavioral change. Individuals who are environment-friendly, aware of the environmental problems and seeking solutions when needed can be educated by the teachers who have sufficient knowledge and experience and know theimportance of environmental education. In line with this purpose, then a ture project titled as 'Environment and Energy with Pro-Fe(Science)ssional Education' has been put into action. As stated in the feedback of the participants, it has been of the opinion that this project is remarkable and useful in regards with supporting applied training and practice. In this context the purpose of this study is to identify the effect and permanence of the TUBITAK (Scientific and Technological Research Council of Turkey) project titled as 'Environment and Energy with Pro-Fe(Science)ssional Education' on environmental attitude, environmental behavior and self-efficacy beliefs of environmental education. The study based on quantitative research was carried out in accordance with pre-test, post-test and retention test design. Participants of this study consist of 37 teacher candidates selected through purposeful sampling among 286 students, who applied to the project held between the dates 17th-23rd June, 2014. As data collection tools, "Environmental Behavior Scale", "Renewable Energy Attitude Scale" and "Environmental Self-Efficacy Scale" were used. SPSS programme was used to analyze the data and One-way ANOVA for independent variable was applied to demonstrate the differences between the means cores. LSD was used for multiple comparison test. Data analyses reveal that there is a significant difference in favor of post-test and retention test as a result of pre-test, post-test and retention test analyses of the Environmental Behavior Test, Environmental Behavior Scale and Environmental Self-Efficacy Scale. In the other words, it has been observed that with the environmental education project, statistically significant increase was found in the participants' environmental knowledge scores, environmental self-efficacy beliefs scores and

environmental behavior scores. This case asserts that activities carried out and applied training are effective and permanent. It is expected that teacher candidates will use this experience in their professional and future life.

Keywords: Pro-Fe(Science)ssional education, Environmental education, Environmental behavior, Self-efficacy

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INVESTIGATING PHYSICS TEACHERS' CLASSROOM PRACTICES OF PHYSICS CURRICULUM

Ayşegül Sağlam Arslan, Nedim Alev, Tuncay Özsevgeç, Alpaslan Şahinoğlu

The general aim of the current physics curriculum is to develop scientifically literate students and therefore encourage them to solve the cases or problems they faced using their scientific knowledge. Bearing teachers' roles in achieving these goals of the curriculum in mind, this study aims to determine physics teachers problems throughout the application of the existing curriculum. The participants of this case study are four physics teachers working in Anatolian High Schools. The participating physics teachers' actual practices were observed and video-recorded throughout four weeks. The video-recorded data consisting of 32-lesson hours were analyzed by using Nvivo9 software. Considering the pre-determined themes within the scope of this study, such as introductory activities, didactical structure of the lessons, teacher-student communication, student-centered approaches, assessment and evaluation, and classroom management, general state of current teachers' practices was analyzed and the basic problems encountered were determined. Findings revealed that the participating teachers had some issues in particular aspects of performing within the framework of the current curriculum, such as creating scientific debates, providing short repetitions or summaries towards the end of lesson, providing examples from daily life, linking topics or concepts, directing students to reach knowledge and using assessment-evaluation activities.

Keywords: Physics curriculum, self assessment

INVESTIGATING TEACHER CANDIDATES' KNOWLEDGE STRUCTURES ABOUT QUADRILATERALS BY THE METHOD OF USING CONCEPT MAPS

Tuğba Horzum

The purpose of this study was to investigate pre-service teachers' understandings of quadrilaterals that they create in a concept map about this concept. The data were collected in the 2014-2015 spring semester from 26 participants. They were asked to construct their own individual concept maps about the quadrilaterals. Participants' concept maps were analyzed and it was found that they used mostly partial classification. Moreover, it was identified that the participants represented the concept maps by using figures and algebraic expressions. Additionally, it was found that the majority of the participants had some wrong information related to the quadrilaterals.

Keywords: Concept map, Quadrilaterals, Teacher candidates

INVESTIGATING THE ECOLOGICAL FOOTPRINTS OF PROSPECTIVE TEACHERS

Safa Özgürler, Arzu Cansaran

The aim of this study is to investigate the ecological footprints of prospective teachers. In this scope the ecological footprints of the prospective teachers were analysed with regard to their state of taking environmental courses, the department they go to, and their gender. The scanning model, one of the descriptive research methods, was used for this research. The population of the research consisted of the prospective teachers studying in the departments of Science Teaching, Class Teaching, Pre-school Teaching, and Turkish Language Teaching in Amasya University in the educational year of 2013-2014. The ecological footprint calculating scale was applied to the prospective teachers within the scope of the research. The data gathered from the research were analysed by the SPSS 18.0 statistics software. According to the results of the research, it was discovered that the prospective teachers have apparent footprints. Besides, the findings show that there is significant difference between the footprints of the prospective teachers. A significant difference couldn't be found with regard to the prospective teachers' state of taking the environmental courses. In addition, it was discovered that, when their footprints regarding the departments they go to was investigated, there wasn't any significant difference.

Keywords: Ecological footprint, Environment, Prospective teachers

INVESTIGATING THE EFFECT OF ANALOGY BASED 5E INSTRUCTIONAL MODEL ON 7TH GRADE STUDENTS' ACADEMIC ACHIEVEMENT IN THE UNIT OF ELECTRICITY

Abuzer Akgün, Ümit Duruk, Haci Mehmet Çoban

One of the most important issues facing science teachers is to become capable of teaching more effectively. However, science teachers often tend to use only textbooks belong to science courses and think there is no need to use extra instructional sources. Hence, it is getting more vital for teachers to develop more constructive learning activities and persist on doing science consistently in the courses. The present study seeks to explore any possible effect of Analogy-Based 5E Instructional Model on 7th grade students' academic achievement in the unit of Electricity. The study was completed in five weeks of the spring semester of 2015-2016 at a state school located in a city center. The study was conducted according to quasi experimental design with pre-post tests. Totally sixty students both from experimental group and control group were exposed to implementation during the process. Students in both groups were categorized into their learning styles according to Kolb's Categorization. During the process, the control group was instructed with regard to 5E Model, on the other hand, the experimental group was instructed with Analogy-Based 5E Model based on instructional materials contain analogies. In conclusion, it was seen that students in the experimental group showed statistically significant difference in terms of academic achievement compared to those in control group.

Keywords: 5E instructional model, Analogy, Learning styles, Academic achievement

INVESTIGATING THE EFFECT OF VALUE EDUCATION ACTIVITIES INTEGRATED WITH SEVENTH GRADE SCIENCE SUBJECTS ON STUDENTS' VALUE DEVELOPMENT

Ayhan Çinici, Kevser Herdem

In this study, it was aimed to investigate the effect of value education activities integrated with 7th grade science contents on the development of five general educational values (tolerance, culture of democracy, solidarity, self-reliance and perseverance) through a mixed-method approach. In this study, it was used an explanatory mixed-method (together with quantitative and qualitative methods) design. To illustrate quantitative findings about participants' development of the values, study was supported with qualitative data gathering methods. In the quantitative phase, a quasi-experimental "pre-test and post-test control group model was used. Participants of the study were composed of 61 seventh grade students totally, 21 of whom are female and 40 of whom are male, in two separate classes (7A and 7B) of a middle school in Diyarbakır which is located in the southeast of Turkey. One of the class was attended as experimental group and the other was attended as control group randomly. At the beginning of the study, both of the groups' behavior and academic achievements scores were compared to determine whether the groups were equal. Thus, students were determined to be equivalent in terms of academic achievement and behavior scores. During data gathering process, firstly, quantitative data were collected through a form contains 12 dilemmas was implemented as pre-test and post-test. The dilemma form were also provided qualitative data as well as newspapers containing value based events and which were prepared by the experimental group. These data sources are subjected to content analyses, and therefore code, categories and themes were identified and presented with sample phrases written by students. The findings of the study showed that teaching activities including values education supported the 7th grade students' value acquisition. Analyses of average scores obtained from pre and post intervention of the dilemma form were revealed a statistically significant development in favor of post-test scores of the experimental group. On the hand, qualitative data which were only obtained from experimental group supported the findings of quantitative ones.

Keywords: Education cartoons, Science education, Values education

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INVESTIGATION OF INTER-DISCIPLINARY FOR TEACHERS AND ADMINISTRATORS OF VIEWS BETWEEN TEACHING APPROACH

Asuman Ilk, Ela Ayşe Köksal, Hülya Kahyaoğlu

This study investigated the extent to which implementation and applicability in primary and secondary schools. Research had been carried out with 22 subject teachers, two deputy managers, and one head teacher of one middle school in the central province of Konya, Qualitative research approach was adopted and interview form prepared by researchers was applied to teachers and administrators to collect data. The interview forms were applied separately for administrators and teachers. Interview forms are intended to identify thoughts and views on demographic information and applications for inter-disciplinary approach. Frequency calculations were used to analyze the data. The tables were prepared to note the participants' comments. Teachers and administrators were found that this approach can be applied. However, they emphasized the need to reduce the intensity of the curriculum.

Keywords: Interdisciplinary education, Association, Teacher opinion, School administrator opinion

INVESTIGATION OF MATHEMATICS TEACHERS' VIEWS ABOUT IMPROVING PROBLEM SOLVING SKILLS

Cemalettin Yildiz

Since problem solving skills play a central role in middle and secondary school mathematics curricula, this made mathematics educators give importance to this subject. Improving problem solving skills of students is one of the primary aims of education so it is very important to make students gain problem solving skills. Thus, the aim of this research is to investigate views of middle and secondary school mathematics teachers related to improvement of problem solving skills. Qualitative research method was used in this study. The research was done on fall term of 2015-2016 academic year. The study was conducted with 115 mathematics teachers (60 middle school and 55 secondary school) working at state schools. Data were gathered by a form consisted of open ended questions and analyzed by descriptive and content analysis techniques. At the end of the research, it is found that teachers had information about the importance of problem solving skills improvement in mathematics education. Also, it is determined that participants thought teachers should have a central role in improving problem solving skills and students should strive in problem solutions. In addition, it was found that teachers believed that mathematics and other lessons improved problem solving skills and improvement in problem solving skills had a positive effect on the achievement in mathematics and other lessons. Lastly, teachers thought that students whose problem solving skills had improved were more successful than the other students and had higher self-confidence than others. They also stated that since it had an impact on improvement in problem solving skills, it should be given importance to level of students when the textbooks were prepared.

INVESTIGATION OF MIDDLE SCHOOL STUDENTS' LEARNING STYLES AND ATTITUDES TOWARDS MATHEMATICAL PROBLEM SOLVING

Kemal Özgen, Mehmed Ay, Zülküf Kiliç, Gökhan Özsoy, Fatma Nur Alpay

The purpose of this study is to investigate middle school students' learning styles and mathematical problem solving attitudes according to gender, class level, mathematics achievement scores and perception of use of mathematics in real world. In addition, is to determine the effects of students learning styles on mathematical problem solving attitudes. In this research, survey model has been used which is descriptive research methods. The study group of this research consists of 725 middle school students. Students are studied 5th, 6th, 7th and 8th grades at the four different middle schools in the center of three cities. Kolb learning style scale, attitude scale towards mathematical problem solving and personal information form have been used as data collection tools. In the analysis of the obtained data, t-test, chi-square, kruskall wallis and regression analysis were performed. The results of the data analysis demonstrated that middle school students' dominant learning styles are diverger and accommodator. It is found that there are significant differences between learning styles according to gender and between mathematical problem solving attitudes according to class level. The same analysis also revealed that there are significant differences between learning styles and mathematical problem solving attitudes according to mathematics achievement scores and perception of use of mathematics in real world. While students' attitudes towards mathematical problem solving become positive, it has seen rising mathematics achievement scores. Moreover, it was found that there is a relationship between students' perceptions of use of mathematics in real world and learning styles. In the study, a low-level significant correlation was found between concrete experience, reflective observation, abstract conceptualization and active experimentation variables which are components of Kolb learning styles model and mathematical problem solving attitudes.

INVESTIGATION OF MOBILE AUGMENTED REALITY APPLICATIONS

Veysel Demirer, Çağdaş Erbaş

The mobile technologies are able to help us organize and direct our daily lives through the mobile applications which we use during the day. The mobile augmented reality applications are one of these applications that can be used on mobile devices. Augmented reality applications on mobile devices are used in various fields such as manufacturing industry, healthcare, education and advertising in particular. It seems that the mobile augmented reality applications can also be used in the field of education thanks to their interactive capabilities, two and three-dimensional visual support, video playback capability and ability to link external web pages. In this regard, this is a review study that analyses certain applications of mobile augmented reality in terms of educational context. By this aim the Alive, Augment, Aurasma, Blippar, Junaio, Layar and Wikitude augmented-reality mobile applications were analyzed comparatively and their usability in the educational environment has been evaluated by means of some criteria. Their features are investigated comparatively in educational environments, so we prepare a control list for assessment. As a result, it can be said that mobile augmented reality applications have no compatibility issues with mobile operation systems in general, can be run in mobile devices such as smart phones and tablet computers, support two and three-dimensional images and have video playback feature. In addition, it can also be stated that the mobile augmented reality applications generally have connections to social media and capable of linking to external website. However, only two mobile augmented reality applications were found to have location-based support. Looking at the studies on mobile augmented reality, it is seen that these applications can be used in educational settings for various purposes. Consequently, some recommendations were made for the use of mobile augmented reality applications in educational environments.

Keywords: Augmented reality, Mobile applications, Educational use

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INVESTIGATION OF OPINIONS OF PRE-SERVICE TEACHERS REGARDING ONLINE CASE STUDY LIBRARY (FATIH2023.NET)

İsmail Çelik, İsmail Şahin

The purpose of this study is to examine pre-service teachers' opinions regarding an interactive online case study library which contains in-service teachers' use of technologies provided by the Movement of Enhancing Opportunities and Improving Technology (FATIH) Project. For this purpose, the case study library designed was utilized in teaching practice classes of pre- service teachers who study at the department of geography education. Afterwards, pre-service teachers have been asked about the educational functionality of the library. A semi-structured interview form was used to collect the data in the study in which 11 pre-service teachers participated in. The obtained data were analyzed by descriptive analysis of qualitative research methods using NVivo 10. According to the analysis of the data obtained, research findings are grouped under five themes. Related themes are as follows: benefits as a candidate, using interactive whiteboards in teaching, pedagogical approaches in teaching, benefits of the case studies in teaching, and drawing attention of a teacher who uses technology effectively. Pre-service teachers' examination of the case studies in the online library has contributed them in these subjects: "thinking of what I would do in this situation", "awareness for future in-class problem", "feeling incapable of solving a technical problem" and "software awareness used in education." According to the pre-service teachers, online interactive web site that increases the level of empathy and awareness can be used in teacher education.

Keywords: FATIH project, Case based library, Teacher education

INVESTIGATION OF PHYSICS TEACHER CANDIDATES TO ESTABLISH THE RELATIONSHIP BETWEEN SIMPLE HARMONIC MOTION AND UNIFORM CIRCULAR MOTION

Güner Tural, Demet Tarakçi

The aim of this study was to reveal the status of physics teacher candidates to establish the relationship between simple harmonic motion and uniform circular motion. The working group of the study was totally 52 physics teacher candidates. The group that received general physics courses before consisted of 16 physics teacher candidates from 3th grade, 17 physics teacher candidates from 4th grade and 19 physics teacher candidates from 5th grade. Aim oriented measurement tool that contains eight open-ended and drawing questions was developed. Data were analyzed via document analysis method. Teacher candidates' answers were evaluated with rubric consisted of correct answer, partially correct answer, correct-wrong answer, wrong answer and unanswered categories. Data showed that teacher candidates' answers mostly gathered in wrong answer category. It was concluded from this data that physics teacher candidates have problem to establish the relationship between simple harmonic motion and uniform circular motion.

Keywords: Simple harmonic motion, Uniform circular motion, Physics teacher candidate

INVESTIGATION OF SECONDARY SCHOOL STUDENTS ATTITUDES TOWARDS MATHEMATICS AND USE OF INTERACTIVE WHITEBOARD IN MATHEMATICS COURSE IN TERMS OF GENDER, GRADE LEVEL AND SCHOOL TYPE VARIABLES

Kübra Açikgül, Sema Nacar, Celal Çakan

The aims of study were to determine secondary school students attitudes towards mathematics and use of interactive whiteboard in mathematics course. Besides it was aimed to examine whether students attitudes differed with respect to gender, grade level, type of school. This research was designed using descriptive and correlational survey model. The study group consisted of 831 students. Data were collected through "Personal information form", "Attitude scale of mathematics", "Attitude scale towards interactive whiteboard in Mathematics Course". This study showed that the students' attitudes of mathematics didn't differ with respect to gender, grade level, type of school but it differed significantly in terms of interaction of grade level and type of school. It was determined that students attitudes towards use of interactive whiteboard in mathematics course didn't differ gender and type of school and students' attitude levels differed significantly between grade level and interaction of grade level and type of school.

Keywords: Interactive whiteboard, Mathemattics education, Attitude

INVESTIGATION OF TEACHERS' PERSPECTIVES FOR ROBOTIC APPLICATIONS

Sibel Açişli

In this study, it was aimed to determine the opinions of teachers about robotics. This research aims to explore knowledge level and opinions of teachers in regard with robotic applications. In this research one group pretest-posttest design is used. The study group of this research consists of 20 teachers. "Robotic Pre-test", "Robotics Satisfaction Test", "Personal Information Form" and a semi-structured interview from developed in accordance with the literature were used to collect the data. In the analysis of the data obtained, descriptive statistics (frequency and percentage distribution) were used to evaluate Robotics Pre-Test and Robotics Satisfaction Test; inductive content analysis was used to analyze the interview data. According to the findings of this study, knowledge level and opinions of teachers in regard with robotics and how they see robotics as a method in education were determined. At end of the study, it was eventually found that teachers have very positive thoughts about robotics. Robotic applications appear to increase their self-belief and confidence.

Keywords: Robotic, teacher

INVESTIGATION OF TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE AND SELF-REGULATION OF THE PRIMARY TEACHER CANDIDATES

Ismail Kenar, Halil Ibrahim Demir

Nowadays, innovative technology in many fields with the rapid development of technology has been used in an active way. In this case, the teaching and learning environment manifests itself in different ways and with use. Innovative developments in technology offers users to continue their education everywhere without limits of time and space. Many appliances and devices produced with software and hardware to meet the various needs; don't know how to use, it can not be used efficiently enough in the field of education for various reasons, such as the appropriate use of its limited ability to use or purpose. The reason is that because teachers can be shown, adequate technology have not the knowledge and information they can not integrate the technology in their education and training process. Especially at the primary level students, they do not understand lessons content of consist of abstract concepts such as science and mathematics. Visuals in teaching the concepts hard to understand, animations and audio elements are seen to be effective. Nowadays, various projects initiated by Ministry of Education is ongoing, to improve the quality of education, give a lessons and educational technology of the factors that limit to ingratiate to eliminate the negative effects of general purpose for instance Increase Opportunities and Technology Improvement Movement (FATIH) (ME [MEB], 2013). Studies on the use of technology in education increased computer, internet, projection and such as mobile devices many technological innovations with inclusion into the education system. And with the quickly ongoing technological developments of these technologies; be aware of, can be use them, can integrate education together the pedagogical content knowledge has become more important be able to synthesize these Technologies (Canbazoğlu Bilici, 2015; Mishra & Koehler, 2006; Schmidt ve diğerleri, 2009). Many studies have been made in recent years about the importance of the teaching-learning process self-regulation learning and self-regulation concept as important as Technological Pedagogical Content Knowledge (Zimmerman, 2000; Pintrich, 2000). Our country has passed from teacher-centered education in a student-centered educational constructivist approach, introduced in 2005; Critical thinkers, capable of self-assessment and has become more important to train individuals capable of acting on their own learning process. Students have an impact on the learning process while the issue of "self-regulation" has brought the concept of the agenda. Self-regulation and self-formed thoughts, feelings and adapted cyclically to achieve personal goals is defined as planned movements (Zimmerman, 2000). No longer can follow the rapid developments in

science and technology today, that science literacy and the training of individuals who are expected to organize their own learning from educational institutions (Aydin ve Yel, 2013). Here with the movement of technological knowledge, technology can be integrated into education, can regulate the learning environment to meet the training needs, which can transmit the information to the students using the best of the pedagogical knowledge and require them to nicely guidance capable teacher. Technological pedagogical content knowledge is expected to be adequate classroom teachers and classroom teachers' self-regulation level at the same time is expected to be sufficient. Learning takes place in an environment where students and teachers take their example. When they start teaching profession and investigation of Technological Pedagogical Content Knowledge and self-regulation of the profession before starting primary teacher candidates who will be a role model to the students in her next life it is important. Considering the aforementioned all these statements before the start of the primary teacher candidates to the profession, technological pedagogical equipped in terms of knowledge and skills, the knowledge and skills is a reality that must be individuals who use efficient in the educational environment. In this study "Investigation of Technological Pedagogical Content Knowledge and Self-Regulation of the Primary Teacher Candidates" is aimed. This research will be performed with survey method. The sampling determined by the non-random sampling purposeful sampling method. Research sample of the 2015-2016 academic year studying at the University of Dumlupınar constitutes 150 primary teacher candidates. In order to investigation of technological pedagogical content knowledge and self-regulation of the primary teacher candidates used the Self-regulation Scale, Technological Pedagogical Content Knowledge Scale and personal information form. Self-Regulation Questionnaire: developed by Brown, Miller & Lawendows that Turkish adaptation of self-regulation scale, reliability and validity done by Aydin, Keskin and Yel (2014). Aydin, Keskin and Yel, the Cronbach alpha internal consistency reliability coefficient of 0.87 and 0.91 were calculated as KMO validity. Technological Pedagogical Content Knowledge Scale: developed by Schmidt and et al (2009) Turkish adaptation of Technological pedagogical content knowledge scale, reliability and validity done by Kaya and Dag (2013). Kaya and Dag, Cronbach's alpha reliability coefficient of the scale as subscale values ranging from 0.77 to 0.88 and 0.91 were calculated as KMO validity. Personal information form; age, gender, constitutes personal information, such as the class level. Data analysis process is continuing. Findings after the completion of the analysis of data that will be obtained in accordance with the information given above will be discussed and interpreted the results of these findings by comparing with the literature will be made some suggestions.

Keywords: Technological pedagogical content knowledge, Self-regulation, Primary teacher candidates.

INVESTIGATION OF TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE OF SCIENCE TEACHER CANDIDATES

Hafife Bozdemir, Sevcan Candan, Ebru Ezberci Çevik, Mehmet Altan Kurnaz

The requirements of today's learning conditions have made the necessary changes on the preparation of the learning environment, the role of teachers and students and using technology. Teacher training institutions aim to gain the changes, and in this sense they are especially trying to integrate technology to their programs (Kaya & Yılayaz, 2013). Integrating the technology to the teaching activities by teachers began to be seen as professional competence (Albayrak-Sarı et al., 2016). As a result of the training school to train qualified teachers set targets for the use of technology, Technological Pedagogical Content Knowledge (TPACK) concept was born (Abell, 2008). TPACK consists of 3 types of knowledge [Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK)] and knowledge from their partnership/intersections [Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK)] that should have an educator (Mishra & Koehler, 2006; Shin et.al. 2009). TPACK is the extent to support education at all stages of a lesson (Niess, 2011) and to use technology in the educational environment (Graham et. al., 2009). In this manner, it seems important for

teacher candidates to examine their TPACK. This research aimed to determine TPACK of science teacher candidate and to compare their knowledge in terms of some variables. The research was carried out by 87 science teacher candidate (4th grade) at a university in Black Sea Region of Turkey. The survey research model was used in the study. Data were collected by using a TPACK scale developed by Schmidt, Baran, Thompson, Mishra, Koehler ve Shin (2009) and translated in Turkish by Öztürk and Horzum (2011). The scale has 47 items and 7 factors (technology knowledge, content knowledge, pedagogical knowledge, pedagogical content knowledge, technological content knowledge, pedagogy technological knowledge, and technological pedagogical content knowledge). Data were analyzed using descriptive statistics in SPSS. In the analysis, it was determined that average TPACK scores of participants were close to each other although they perceived themselves most sufficient in PK dimension, and in least TCK dimension. The training of science teacher candidate is considered to be done by increasing the content of the relevant regulations and is recommended for TCK.

Keywords: Technological pedagogical content knowledge, Teacher training, Science teacher candidate

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INVESTIGATION OF THE EFFECT OF ROBOTIC APPLICATIONS IN ELEMENTARY EDUCATION

Sibel Açişli

In this study, it was aimed to investigate the effect of robotic applications of 7th grade students on their attitudes towards Science Process Skills and Science-Technology-Engineering-Mathematics (STEM) according to some variables. The research group of the study consists of a total of 20 7th grade students in the academic year of 2005-2016. In the study, "Science Process Skills Test", "STEM Attitude Scale" and "Personal Information Form" were used to collect data. In the analysis of the data obtained, t-test, analysis of variance, mean and standard deviation calculations were used to evaluate scientific process skill levels of the students and STEM Attitude Scale data. The data obtained from the study will be analyzed with SPSS and the results will be discussed.

Keywords: Elementary education, Robotic, Science process skills

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INVESTIGATION OF THE INFLUENCE OF PRE-SCHOOL EDUCATION ON THE SUCCES LEVELS OF UNDERGRADUATE STUDENTS IN ENGINEERING FACULTY

Emel Dokur Mermerdaş, Kasim Mermerdaş

The facilities in Pre-school education (PSE) program covers science, math, arts, game, music, preparation for read-write etc. In this study, the influence of pre-school education on the students of engineering faculty where there is science based education was investigated. For this purpose, a comprehensive questionnaire was applied to 203 senior students studying in Engineering Faculty of Gaziantep University. The purpose of the questionnaire is to determine the level of different aspects of success between the students who received and not received PSE. The data obtained from questionnaire were statistically analyzed to find out the difference in the level of success. Based on the findings, it was observed that the students receiving PSE had been more successful in winning the university entrance exam and generally were more successful during studying in engineering faculty than the others. Knowing that although the level of preschool education is very low in Turkey (about 10%), there is an impressive finding that 41% of the students investigated in this study had received PSE.

Keywords: Preschool education, Higher education, Science/math studies

INVESTIGATION OF THE LEVEL OF INTERESTS OF SECONDARY STUDENTS IN STEM CAREER FIELDS

Erhan Külekci, Ayşegül Ergün

The purpose of this study to determine the level of interest STEM (Science, Technology, Engineering and Mathematics) career fields of Secondary students'. In this study, professional areas of interest STEM scale used that Ki, Blanchard, Osborne and Alberta (2013) by developed and Turkish adaptation study Bilen, Ergun and Irkıçatal (2015) by the conducted. Scale Science, Technology, Engineering and Mathematics for the four subscales and consists of a total of 44 substances, including 11 items in each dimension. The sample of the study consisted of a total of 437 students (216 female, 221 male). Hypothesis of the study were analyzed independent samples t test and one way ANOVA with SPSS. According to the research results average scores taken by students from every area of the scale; Science, Technology and Mathematics fields at a high level, the field of Engineering has been moderate level. The average score from the whole scale is high level. There was no significant difference between the mean scores of girls and boys their interest in science and mathematics career fields. There was a significant difference between the mean scores of girls and boys their interest in Technology and Engineering career fields in favor of boys. In addition, There was a statistically significant difference between the mean scores of classes their interest of Science, Technology, Engineering and Mathematics

Keywords: STEM education, STEM career fields interest, Secondary STUDENTS

INVESTIGATION OF THE PROPORTIONAL REASONING LEVELS IN SEVENTH GRADE STUDENTS

Mustafa Gök

The purpose of this study is the determination of the proportional reasoning levels of 7th grade students. Descriptive analysis, a qualitative research method, was employed. The data prepared by the researcher was incorporated into four questions and was gathered in a one page document in order to be solved by the students in a classical way. The participants of this study are consistent of 146 seventh grade students from two public schools located in the central cities of Van. The data was analysed in accordance with the levels specified in the studies of Langrall & Swafford (2000). The results of the study demonstrated low levels of proportional reasoning attitudes in most of the 7th grade students. We suggest that, more problem situations which are supportive of the proportional reasoning levels of the students have to be incorporated into the education system.

Keywords: Proportional reasoning levels, Problem solving, 7th grade

INVESTIGATION OF UNIVERSITY CHEMISTRY STUDENTS' MENTAL MODELS OF METALLIC BONDING AND STRUCTURE OF METAL

Canan Nakiboğlu

The metallic bonding is one of the central topics in chemistry and involves the use of a variety of models. Students are expected to progress in an understanding of these models. Mental models are real representations of objects, ideas or process which individuals generate during learning process. How learners' develop mental models are strongly influenced by their prior learning. The sea of electrons metaphor for the metallic bond is used in teaching metallic bonding commonly in secondary education. Chemistry students are taught metallic bonding in general chemistry course by using both sea of electrons metaphor again and also the band theory of metals that is more sophisticate theory. On the other hand, research has shown that students have a poor understanding of the bonding in metals and models for metallic structure and bonding at all level. University chemistry students use electron sea model of metallic bonding although they are taught the band theory of metals. Second year chemistry students' mental models of metallic bonding were investigated in this study. Sample group consisted of 64 (43 female and 21 male) chemistry students taught all metallic bonding theories. To obtain an in-depth understanding of chemistry students' mental models, the data were collected by using a written instrument with two open-ended questions. They were asked to explain the bonding in the cupper metallic structure by drawing in the first question. In the second question, they were asked to define what the metallic bonding is. The analysis of the data was conducted on two different dates by using the content analysis method by the author. It was concluded that most of the students' mental models were simple, in contrast with the sophisticated complex models taught. Some of the students have also hybrid models of the bonding theories.

Keywords: University chemistry students, Mental models, Metallic bonding

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JOURNALISTIC TEXTS IN SCIENCE TEACHING: DOES MEDIA LITERACY MATTER?

Tali Tal, Avshalom Ginosar

This research aims at exposing and understanding the ways science teachers use journalistic texts dealing with environmental topics and determining the impact of such usage on students' learning and tendency to engage in issues of science and society. The mixed-method study consists of: content analysis of online journalistic texts on environmental topics published on seven top-rated news websites, during a three-month period; two teacher questionnaires: the first investigates how teachers use journalistic texts in their classes; the second aims at learning about the teachers' journalism literacy. Out of the texts we identified, informative texts made 90%, 10% were opinion articles, and commentary items made less than 1%. The writers were: professional journalists (87%), opinion writers (6%), experts (5%) and stakeholders (3%). The two leading environmental topics were: ecosystems, biodiversity and conservation (27.6%), and landscape, open space and urban environment (26.1%). Forty middle school science teachers responded Questionnaire 1. 87% indicated they use journalistic text in their teaching. Most of them (74%) use them few times a year, and 15% use such texts about once a month. The most common topics of articles used by teachers are air and water pollution and biodiversity. The preferred type of journalistic item is an informative text, and teachers prefer text written by experts. In the conference, we will report on the results of questionnaire 2. We hope that the findings of this proposed research will contribute to the dynamic field of science communication by demonstrating how teachers can use journalistic texts in their teaching and how enhancing teachers' media literacy can contribute to the informed use of such texts in the classroom; indicating if and how the use of journalistic texts enhances students' critical thinking and their engagement in public debates and activities regarding issues of science and society.

Keywords: Journalistic texts, Environment, Media literacy

LEARNING SCIENCE BY ONLINE EXPERIENCE: GO-LAB

Hasan Ozgur Kapici, Ton De Jong, Hakan Akçay

The presentation introduces a new online lab platform which is called as Go-Lab. Go-Lab centers around inquiry learning with online laboratories. Go-Lab aims to educate individuals as scientifically literate people which is one of the main purposes of science education and in order to reach that goal, inquiry based science teaching has enormous potential. Online labs (e.g. Go-Lab) are one of the efficient ways for such kind of teaching. The core activity in an online lab is an investigation (experimentation or exploration) with (physical or virtual) equipment or the possibility of working directly with the results of such an investigation (de Jong et al., 2014, p. 2). Online labs enable users to manipulate the reality (de Jong et al., 2013) and can make learning easier by removing "confusing" details (Trundle et al., 2010). They are also suitable for conducting experiments about electricity (Jaakkola et al., 2008), particulate nature of matter (Herga et al., 2016) or cell division (Gilman, 2006) which are unobservable in a classroom environment. Go-Lab enables students to gain deeper content knowledge and inquiry skills (de Jong et al., 2014) through offering students experiments with online labs in a pedagogically appropriate environment. Go-Lab supports inquiry based science teaching and learning by Inquiry Learning Spaces (ILSs) in which students have guidance (scaffolds) for inquiry learning. In other words, Go-Lab uses a guided inquiry approach as a learning process because research shows that this approach gives rise to better results than unguided inquiry (de Jong et al., 2013). The inquiry approach in Go-Lab comprises of four steps (orientation, conceptualization, investigation, and conclusion) which are derived from related literature. Students can receive dedicated guidance in each step of the inquiry cycle. Go-lab has its own portal for lab owners and teachers in which they can search appropriate ILS and online labs and offers extensive facilities for teachers to create ILSs themselves or to adapt existing ILSs to their needs. Go-Lab can be adapted to local needs, such as the use of the student's own language.

Keywords: Online lab, Science education, Inquiry

LEARNING TO TEACH STEM: CHANGE IN CHEMISTRY AND MATHEMATICS PRESERVICE TEACHERS' BELIEFS ABOUT NATURE OF MATHEMATICS

Fatma Aslan-tutak, Sevil Akaygun, Secil Tezsezen

STEM Education becoming a necessity for 21st century education calls for interdisciplinary understanding and use of the areas science, technology, engineering and mathematics. STEM education requires integration of areas through collaboration of experts of the areas. However, most of the 21st century teachers who need to help their students to gain 21st century skills may lack opportunities to experience those skills themselves. In this presentation, researchers will introduce a module, Collaboratively Learning to Teach STEM (CLT-STEM), developed to introduce preservice teachers to STEM education. CLT-STEM module is developed to use with science and mathematics preservice teachers during their teaching methods courses. In this module, participating preservice teachers were introduced to STEM education and experienced three STEM education activities as a student. Throughout the module they were asked to work in a group (consisting of at least one mathematics and one chemistry preservice teacher). Then, they were asked to work within their groups to develop a STEM education activity. In this presentation, the researchers will present some results from CLT-STEM implementation during 2015-2016 academic year. There were 22 chemistry preservice teachers and 27 mathematics preservice teachers. At the beginning of

the implementation, three surveys (nature of science, nature of mathematics and technological pedagogical content knowledge) were administered. Same surveys were administered at the end of the implementation to check if there was any change. There was a significant difference between pre and post scores for nature of mathematics (p= .046) as a result of Wilcoxon Signed Ranked Test. This significant result may indicate influence of participants working on STEM activities collaboratively on their perception of nature of mathematics. In the presentation, results will also be discussed through other findings (Akaygun & Aslan-Tutak, 2016; Aslan-Tutak & Akaygun, 2016) from the CLT-STEM module.

Keywords: STEM, Teacher education, Pre-service teachers,

LIFELONG LEARNING TENDENCIES OF ACADEMICIANS

Hasan Özgür, Fatma Akgün, Cem Çuhadar

The aim of this study is to determine the lifelong learning tendencies of academicians in terms of some variables. The sample group for the research comprised a total of 408 academicians that works in various faculties of the Trakya University during the spring term of the 2014-2015 academic year. The "Lifelong Learning Tendency" scale and the "IT Literacy" scale were used for the research. Descriptive statistics, Mann Whitney U and Kruskal-Wallis H tests were used to analyze the data. Spearman Brown rank correlation coefficient was used to examine the relationships between scales. It was emerged that the lifelong learning tendencies and information technology literacies of academicians were high and their tendencies vary according to years of service and academic title. The findings of the research revealed a positive and moderate relationship between the lifelong learning tendencies of academicians and their information technology literacies.

Keywords: Lifelong learning tendency, IT literacy, academician

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LINE AND PLANE IN SPACE IN A DYNAMIC LEARNING ENVIRONMENT

Yilmaz Zengin, Enver Tatar

The purpose of this study was to visualize conditions of two lines in space, two planes in space, and a plane and a line each other through a dynamic software. GeoGebra, a dynamic mathematics software, was used in this study. Since GeoGebra is a free open source software which provides dynamic learning environment and has 3D graphics windows, this software is chosen in the study. Examination of a plane and a line in space in dynamic environment may be contributing to develop spatial ability of students. Accordingly, the researchers prepared dynamic materials for teaching space geometry content and these materials were investigated by an expert mathematics educator. After proposed amendments, these dynamic materials were ready to use in teaching space geometry content in high school. The prepared materials offer a dynamic environment to both teachers and students. In this way, it is thought that these materials would provide to test different situations about plane and line.

Keywords: Line, plane, space geometry, GeoGebra, dynamic learning environment

LITERATURE REVIEW ABOUT THE CONCEPT OF GRAVITY IN SCIENCE EDUCATION

Numan Bademli, Seyit Ahmet Kiray

The concept of gravity is a subject which has a vital importance for science educators. Because of its nature,students have got understanding and learning difficulty. As the gravity is a concept that we are in a relationship in our daily lives, it is important for science teaching. For this reason, the studies about gravity will be viewed. In this work in the database of Web of Science, Eric and EBSCO untill the 2000 will be analyzed. It is estimated that the results of studies will be shed light on later researches.

Keywords: Gravity, Science education, Teaching of concept.

MACRO/MICRO WRITING FEATURES IMPACT ON COHESION: EARLY CHILDHOOD ARGUMENT-BASED INSTRUCTIONAL TECHNIQUES IMPACT ON EFFECTIVE COMMUNICATION OF SCIENCE CONTENT

Ted Neal

Early learners engagement in science is vital to their understanding of science. The ability to learn science is critical at this age to set students up for a lifetime of understanding. Our work is grounded in the theory of argument-based inquiry (ABI) where students learn science through the language of science, with an understanding about the language of science, all while living the language of science. Evidence of students' ability to comprehend science is evident in their display of multi-modal representation as they communicate their conceptual understandings. Our project examined the effectiveness of an ABI method with early learners, grades k-2. Students were divided into classrooms based on teacher ABI experience with a traditional approach (n=115); /= 1 year experience (n=176). Students constructed a document demonstrating their conceptual understanding using text and/or drawings. These documents were scored for the amount of unique text and picture ideas, the amount of organizing text and picture features and the degree of cohesiveness. Our findings support the idea that students in an ABI classroom more effectively use both macro and micro-writing features that help to organize and present science content. Given young children's difficulties with informative text, this is an especially important finding. In addition, students with teachers with >/=1 year are twice as likely to demonstrate multi-modal forms of cohesion (26.9% no experience, 28.6% /=1 year). Finally, we found students 1.4 times LESS likely to be highly cohesive in a classroom with a teacher with /=1 year experience. This shows an initial regression as implementation occurs offset by significant gains as experience increases. These findings indicate that an ABI approach helps students learn and communicate science concepts.

Keywords: Multimodal, Science content, Early childhood, Organizing text features, Representational ability, Integrated science and literacy instruction, Science writing heuristic, Immersive argument-based inquiry

MAXIMIZING THE GAINS OF COMPUTER ASSISTED INSTRUCTION IN MATHEMATICS TEACHING

Philomina Ifeanyi Onwuka

The use of computer Assisted Instruction has positive effect in the academic achievement of students in Mathematics. Against this background, the study sought to determine the extent of the utilization of Computer Assisted Instruction in the teaching of Mathematics in the Secondary Schools in Nigeria. The study was carried out in Ika-South and Ika-North East Local Government Areas of Delta state, Nigeria. All the Mathematics teachers in the schools were used for the experiment. They were 80 Mathematics teachers made up of 42 males and 38 females. A descriptive survey design was adopted while the research instrument was questionnaire. Five research questions guided the study and the research questions were addressed using graphs, percentage and frequency counts. Three hypotheses were formulated which were tested with t-test statistical tool at 0.05 level of significance. The result of the study indicated that teachers possess knowledge of computer and they have computer sets in their schools but no power supply for their usage. Furthermore, the teachers do not teach Mathematics contents using computer. It was also found that Gender and School location (Urban and Rural Areas) have no influence in the use of Computer Assisted Instruction. Adequate recommendations were made, among which; are that Mathematics teachers should be giving In-Service training by Government on the use of computer to teach Mathematics, they should be encouraged to use computer in the teaching of Mathematics and that schools should be provided with adequate power supply.

Keywords: Maximizing, Computer, Mathematics, Teaching,

MEAN, MEDIAN AND MODE FROM A DECISION PERSPECTIVE IN A PROBLEM SOLVING LESSON

Esra Balgalmiş

The purpose of the present study was to investigate the role of mean, median and mode in a decision-making problem-solving content from 7th grade students' point of view. For this study a problem-solving lesson was planned to have students actively engaged in the process of statistical problem solving in a realistic situation and explore their ideas about the central tendency. The problem task was not easy to solve when reading at the first sight and there were many different solutions for this problem. During the solution process it was expected students discovered the importance of choosing a measure of central tendency, and understand the probability distributions. During the lesson, pre-service teacher created a discussion environment, provided students opportunity to involve in the solution process, and shared their ideas. Mostly used problem solving strategies were making an orderly list, eliminating possibilities, looking for a pattern and drawing a table. Most of the students chosen mean as a solution for he problem and ignored the power of the median and mode even if there were outlier scores. The significance of this study arises from the need for concrete example of effective problem solving lesson in middle school in terms of mode, mean, median. Design of the study was a case study. The participants of the study were chosen by purposive sampling method (Creswell, 2007). Students' documents related to solution of the problem and classroom observation was the main data sources. Semi structured interview with pre-service mathematics teacher used as an additional data source in order to get in-depth information about the problem solving procedure. In conclusion, when we consider statistical literacy is the ability to predict and evaluate statistical results in daily life, teaching via problem solving environment with real life situation is essential to determine students learning. Problem-based teaching encourages students to understand a deep level approach to their learning.

Keywords: Problem solving, Statistics, Central tendency, Mean, Mode, Median

MEASURING PERIMETER AND AREA WITH WEB-BASED TEACHING

Demet Temiz, Aytaç Kurtuluş

Although the subject of measurement is a part of our daily life, it is one of the areas mostly leading to misconceptions. The findings obtained from the international studies such as TIMMS and NAEP also show that the students are weaker in the field of measurements than the other subjects. To eliminate the misconceptions of the students in this regard, first of all it is necessary to determine the factors preventing their comprehension and to develop teaching method and techniques accordingly. This study is an action research which aims to determine and eliminate misconceptions of the 6th grade students in the fields of measurement units, periphery and area. The study was conducted with the participation of 16 students who continue to study in the 6th grade in a secondary school in the city center of Artvin. Two web-assisted activity applications were prepared and applied to the students. In the first activity, a problem scripted for length measurement and area measurement was presented. Group study was made in this study. Computer means through which the students will utilize internet was supplied to all the groups and the problem was presented in the computer environment. The lengths of the region, the area of which will be measured, were given using different units. The students were asked to convert these lengths into meters and to state the area of the region in square meter. The region, the area of which was asked, was presented on a chequered ground in the computer environment and these squares were used as nonstandard area measurement unit, and approximate area measurement was requested. Then, the area of the region was attempted to be found in line with the given length values. Moreover, by means of the web sources given in the activity, the students collected information regarding the subject and made the research in accordance with the scenario. As a result of the first application, problems such as confusing the periphery and area concepts, incomprehensibility of length and area measurement units and use of incorrect units were encountered. With the development of the methods and techniques in the first application, the second web-assisted activity was planned and applied. In this study, in addition to the first activity, as nonstandard measurement units rectangular materials were used. The same materials were distributed to all the groups. The students formed different shapes with these materials and then used these materials as nonstandard area measurement unit and made area measurement. In this study, use of ruler was also supplied for the length measurement. As a result of the second study, it is seen that the students more easily made sense of the area and periphery concepts. According to the results of the interview with the students, the students found the second activity more useful in terms of acquiring the area and periphery concepts. Use of rule for length measurement and use of nonstandard concretized measurement units for area measurement in the second activity made the subject more comprehensible. The student could easily focus on the subject by increasing the visual features of the scripted problems by means of the computer. However, it is concluded that use of technology alone is not adequate for understanding the concepts and it is absolutely necessary to include the activities through which active participation of the student will be provided.

Keywords: Area, Perimeter, Mathematics education, Measurement, Web-based teaching

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MICROSCOPE USAGE INFORMATION: SAMPLE OF SCIENCE TEACHER CANDIDATES

Sibel Demir Kaçan

A qualified laboratory lesson is of great importance in science education. In a qualified laboratory lesson there are so many essential elements such as material, tool and place. One of the most important elements of a qualified laboratory lesson is the equipment used, and usage information and ability of this equipment. Microscope which is frequently used in science education is one of such tools. Microscope usage information is very important for a science educator. Therefore, a teacher who acquired this

information and usage ability will be effective in encouraging students to use the microscope correctly, to have interest in science and even to do research in this field. In parallel with this importance, it is thought that the science educators who study in faculties need to have a good ability of microscope usage information. Based on this expectation, the aim of this study is to identify the ability of microscope usage information of the candidate students who study at science teaching department in 2nd grade. This study has been conducted with 80 2nd grade students who study in science teaching department of a university in Black Sea region of Turkey. Microscope usage information scale which was improved by Benzer and Demir in 2014 has been used as obtainment tool in the study. Microscope usage information scale is composed of tripple likert type 23 articles and two open-ended questions. The data which were obtained from likert type articles have been evaluated with frequency calculation whereas the data which were obtained from open-ended questions have been evaluated with content analysis. According to Büyüköztürk et al. (2008), content analysis is defined as a systematic technique where certain words of a text are summarized with smaller content categories through coding. Based on the results that were obtained in the study, interpretations have been made and suggestions have been offered in order to enlighten other researchers.

Keywords: Microscope usage information, Teacher candidate, Science education

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MIDDLE AND SECONDARY SCHOOL STUDENTS' APPROACHES TO COMPUTER AND INTERNET

Mustafa Serkan Abdüsselam, Cemalettin Yildiz, Resul Göl

The aim of this qualitative study is to determine middle and secondary school students' approaches related to computers and internet. To achieve this aim a form consisted of 8 open-ended questions was used. The implementation was carried out to 322 middle school and 161 secondary school students in Trabzon and Giresun cities on 2015-2016 academic year. It was tried to determine understandings of students related to computer and internet, their computer program and internet sites preferences, the difficulties they have in computer and internet usage, and their suggestions regarding effective usage of computer and internet. The qualitative data obtained were analyzed by content analysis and descriptive analysis methods. Data obtained showed that students saw computer mostly as a tool for amusement and a tool which helped to lessons and they saw internet as the fastest way to reach information and a communication way, they used office programs in computers and preferred communication sites. Also, it was determined that students had some problems in computer and internet usage arising from themselves, others, computers, and internet. Thus, they thought that there had to be in-service training courses related to these problems. Some suggestions were given to students, families, and institutions to make students benefit from computer and internet more effectively and consciously.

Keywords: Computer usage, Internet usage, Middle school students, Secondary school students

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MIDDLE SCHOOL STUDENTS' ENGINEERING DESIGN EXPERIENCE: "HOW ENGINEERS SOLVE THE PROBLEMS?"

Serhat Ercan, Esra Bozkurt Altan, Nurhan Öztürk Geren

The idea of integration is not new in science education. Integrated science and mathematics or technology has deep roots in the educational reform movements. STEM education which has become the motto for

educators nowadays, appears to be different from previous attempts in the sense of emphasizing the engineering discipline. Engineering can serve as an integrator among STEM disciplines. Additionally, from the perspective of the 21st century proficiencies, students have to improve their competencies related to engineering. As a consequence, engineering has become a critical component of the STEM education. However, for a number of reasons, such as current structures of K-12 curriculum and teacher training programs, engineering education seems problematic. Although there have been several attempts to develop K-12 engineering education standards for improving current status of K-12 engineering, no such agreed upon standards have been existed yet. Even though there are several uncertainties associated with what K-12 engineering education should include or accomplish, it is clear that K-12 engineering education should emphasize engineering design. The current study investigated the impact of a design-based science learning process on 7th grade students' knowledge and comprehension related to engineering design process. A qualitative paradigm was used in this study, which was lasted for 5 weeks. 24 7th grade students participated into the educational implementation. Reflective texts and drawings which were created by students related to engineering design process have been used as a primary data source for the study. Also, interview recordings were used for data collection process. Findings indicate that the design-based science learning process can contribute to enhancing students' knowledge and comprehension related to engineering design process.

Keywords: K-12 engineering education, STEM education, Engineering design process, Design based learning

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MIDDLE SCHOOL STUDENTS' MODELING EXPERIENCES: A PAPER PLANE CONTEST PROBLEM

Neslihan Şahin, Ali Eraslan

Given the goals of mathematics education, it has become critical for students to understand and explain mathematical concepts and concept systems, test hypotheses, analyze and explain relationships as well as learn how to reconstruct (Thomas & Hart, 2010). Today, it is not enough to only memorize the mathematical processes and then apply it to similar problem situations. To prepare students for their future beyond the school, it is required that students are able to gain experience on complex problem situations that help them to develop mathematical thinking and constructing new mathematical concepts (Lesh & Zawojewsky, 2007). Mathematical model and modeling approach can be used for the solution of complex problems that represent real-life situations in which students have actively participated (Sriraman & Lesh, 2006). Therefore, the purpose of this study is to examine 7th grade students' modeling processes while working on the Paper Plane Contest Problem and identified difficulties they confronted in the process. This qualitative research was conducted during the 2015-2016 academic year, in a middle school in a large city along the Black Sea Region of Turkey. Participants were 7th grade students in a state school. Three students among them were selected as a focus group using criterion sampling technique. They then were given the Paper Plane Contest Problem and asked to work on this problem. They were video-taped while they were working on the problem. Mathematical thoughts and written responses of the seventh-grade students were analyzed using descriptive analysis method. The results showed that students (a) had difficulties to understand the problem, (b) developed different strategies for required situations, and (c) selected winner for Best Overall while taking into account of each measurement. In addition, although students faced difficulties to do mathematical operations, they were able to work together in group to overcome this problem.

Keywords: Paper plane contest problem, Middle school students, Mathematical modeling, Model eliciting activity

MIDDLE SCHOOL STUDENTS' SELF-EFFICACY SOURCES IN MATHEMATICS: A QUALITATIVE STUDY

Şule Akyol, Ismail Şahin

According to Bandura's social cognitive theory, self-efficacy beliefs are being fed from four sources. These are mastery experience, vicarious experience, social persuasions and physiological states. Purpose of this research is determining the sources of middle school students' self- efficacy beliefs in mathematics, within the frame of Bandura's social cognitive theory. For this aim, semistructured interviews are going to be held with nine, 8th grade students. The students are going to be chosen from the groups classified according to situation that having low, normal and high self- efficacy beliefs in mathematics. For data analysis Nvivo 11 program is going to be used. The data is collection and analysis stage.

Keywords: Self-efficacy beliefs in mathematics, Interview, Qualitative data analysis, Middle school, Sources of self-efficacy

MIDDLE SCHOOL STUDENTS' USE OF REPRESENTATIONS FOR PROPER FRACTIONS

H. Bahadir Yanik, Osman Bağdat

Fractions are one of the challenging topics for middle school students in mathematics. One reason behind this difficulty might be related to representations. Fractions can be represented through various forms. Area models and number line models are often used by students to represent fractions. The purpose of this study was to investigate how middle school students represented proper fractions using these two models. Data were collected through a written instrument which was administered to 33 6th grade students. The instrument included 4 tasks. While two of the tasks required students to find the part of a whole, the other two tasks asked students to find the whole using the given parts on area and number line model. The data showed that while the majority of students were able to represent the proper fraction on the given area model, very few of them were able to locate fractions on number line and find the whole using the parts.

Keywords: Fractions, Representations, Area model, Number line.

MOBIL BASED TEACHING AND LEARNING MATERIALS FOR CHILDREN WITH AUTISM

Hakan Akcay

The purpose of this study was to explain a computer based application for children with autism spectrum disorder. Autism is a developmental difference which causes social disorder in communication. The most known characteristics of autism is less or no eye contact, low social affect and low levels of social engagement. Along with these changes in taxonomy there has been a greater understanding of the causes of autism, but the picture of the cascade of structural and biochemical events that culminate in the

disorder is still not clear. Teachers and parents of autistic children need serious teaching and learning materials. This study based on the project that was financially supported by Istanbul Developmental Agency. It was completed in 2015 with cooperation between Yildiz Technical University and Yeditepe University. The implementation of social inclusion model was developed through art, sport and education applications for individuals with autism. The model consists of four module concerning art, sport, writing and reading, social interaction. Based on each module, a mobile based education program was developed for children through elementary and middle school.

Keywords: Autism, Using technology in autism, Technology based learning

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MODEL OF STUDYING ELECTROMAGNETIC FIELD AND WAVES THEORY VIA COMPUTER SIMULATION

Tamar Bzhalava, Paata Kervalishvili, Mzia Tsirekidze, Goga Kakabadze

Model of studying the electromagnetic theory, mathematics, computing and data visualization in purpose to comprehend the main ideas of theories and practical applications are proposed. To learn physical processes and system's properties by computer simulation and to learn simulation by solution of physical tasks is the concept of proposed model. Integrated course of electromagnetic (EM) field and wave theories, mathematical solution of equations, computing techniques based on solutions of well known tasks as well as current problems of applied electrodynamics are considered. Application examples of electromagnetic in scientific research, modern technologies represent the abstract theories in realistic existence, help to understand deeply theoretical course, appreciate significance of (EM) theories in many fields of daily life. Knowledge of main theories of electromagnetic combined with mathematics and computing is necessary for solving the electrodynamics problems such as (EM) waves scattering and diffraction, interaction of (EM) field and objects of different electric and geometric properties, basis of linear and nonlinear optical techniques, etc. Selected tasks of electrodynamics are constructed of several modules: formulation of physical problem, theories and methods of solution – physical and mathematical, specifics of problem, approximation and application cases, computer simulation, analysis. Each completed module expands outlook, develops skills, intuition, self-confidence, encourages participants be more motivated, active in learning and improvement of knowledge in multi disciplines. Proposed model is presented by considering one task - EM waves scattering on a single cylindrical body, applicable in radio physics, transmitting and detecting systems, aerosol studies for particles of different origin. Estimation of EM field components, scattering characteristics, theoretical predictions based on analytical solutions and numerical simulations are considered. The work is carried out in Georgian Technical University supported by Shota Rustaveli National Science Foundation (SRNSF) under Grant Agreement (FR/430/3-250/13).

Keywords: Electrodynamics, Wave scattering, Simulation

MODELING BIOLOGY INSTRUCTION – LEADERS IN SCIENCE EDUCATION (MOBILISE): A PROGRESS REPORT

Peter Olesen Lund, Kathy L. Malone, Zakee L. Sabree, Kathleen A. Harper, Karen Irving, Assoc. Prof. Dr. Anita Schuchardt

The two-year research study aims to: a) apply research-based pedagogical teaching techniques and content knowledge in biology, modeling and engineering to affect teacher pedagogical content knowledge (PCK); b) alter teachers' epistemological perceptions about biology and engineering and self-efficacy; c) increase student content knowledge in biology, science models, modeling, and engineering; d) improve student attitudes towards biology and engineering; and e) increase students' attitudes towards engineering and scientific practices. This study will expand existing research on how students' conceptual understanding of secondary biology changes with exposure to models and modeling in the biology classroom. The first year of the project focuses on development of a secondary level model-based biology curriculum using design-based methodology. As the development team, made up of teachers, graduate students, biologists, engineers, science education researchers and learning scientists, constructs each of the five model-based units making up the full year course, the teachers on the team implement the curriculum in their classrooms. Based upon teacher input, the development team revises each unit in preparation for a second phase of teacher training. During the summer of 2016, sixty teachers will be trained and the curriculum will be implemented in their classrooms during the 2016-17 school year. The goal of the large sample curriculum study is to study the efficacy of the curricular design towards improving student and teacher learning in and attitudes towards biology. Curriculum effectiveness will be assessed through analysis of surveys, classroom artifacts, pre/post assessments (Secondary-Biology Concept Inventory), observation protocols, and video analysis of enactment using Edthena software. Our conference presentation addresses a number of the ICEMST conference topics but will focus on innovation and change in biology education. Our presentation will include an overview of the research project, conceptual framework, sample lessons from the Modeling Instruction-based biology and engineering curriculum as well as a discussion of the classroom implementation pilot.

Keywords: Science education, Modeling instruction, Biology, Engineering education

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MOROCCAN TEACHERS' CONCEPTIONS ON FOOD EDUCATION

Sabah Selmaoui, Anouar Alami, Boujemaa Agorram, Salah-eddine Khzami, Abdelaziz Razouki, Student. Fatima Ezzahra Ait Yahia , Prof. Mustafa Aarfaoui

Food education is a component of health education which plays an important role in the development of citizenship and human resources of a country (Jourdan, 2010). School is a vital element in implementing some positive behavior and making students drop out other dangerous behaviors. Today educating students to healthy nutrition allows them to develop the abilities to act, choose, decide on an autonomous and responsible manner and capacity face reality and deal with conflict (Jourdan, 2010). Food is present in our daily lives and in our curricula but the problem lies in the manner/ way in which it is processed, hence the importance of this study. And as the teacher constitutes a strong link of the didactic transposition, he may influence this transposition by his conceptions, values and practices (Clément, 2004). In this context, we are interested in this study to identifying the teacher' conceptions about food education, and answering the following question: - What are the Moroccans teachers' conceptions about food education? We have thus used as a tool of investigation in the form of a questionnaire administered to 200 teachers at all grade levels. The conception of Moroccan high-school teachers towards food education is more often expressed by implementing the Promotion of Health (HP) approach, while those at primary and secondary

college adopt a Biomedical approach (BM) in their definitions. This could be in relation to each grade level teachers' educational background of each level school.

Keywords: Food education, Health education, Conception, Didactic transposition, Teacher, Promotion of health, Biomedical approch.

MOTHERS EVALUATE AN ACTIVITY AIMED AT ENDEARING SCIENCE IN THE OUT-OF-SCHOOL LEARNING ENVIRONMENT: SCIENCE WITH MY MOTHER

Aysun Öztuna Kaplan, Ragip Çavuş

It is considered that introduction of children to scientific activities at early ages plays an efficient role in making them understands science and develop a positive attitude and value towards science. Montessori (1975) who regarded early childhood between 3-6 years of age as the perfection stage has stated that children who have been storing subjects with their absorbing minds try to make sense of the world with their sense organs after that period. Children are in a struggle for discovering what is going around in that period when their senses are highly active. It would not be difficult to arouse interest and curiosity in children that have entered into this process naturally. Despite the fact that children are introduced into the scientific process skills such as observation, comparison, classification and forecast in the pre-school education, it is considered that out-of-school learning environments such as science museums, zoos and science centers would create a high level of curiosity and motivation in younger children. Thus, Bozdoğan (2007) stated that individuals would discover new things and increase their experience in those learning environments. In this study, the data was collected via an activity that was carried on in the out-of-school learning environment that was formerly operated as Science and Technology Club and turned into a science center affiliated to Kocaeli Metropolitan Municipality. Preschoolers between 5-6 years and their mothers that accompanied them (the number of mothers was predominant but fathers, brothers or sisters of some children were also attended) were attended to this activity that was carried out under the name of 'Science with My Mother'. For five days, activities were carried out with children and their mothers in the club. These activities ranged from interesting show experiments and experiments that were performed by children personally to robot making and field tour in the recycling factory. While children carried out their activities under the guidance of club instructors, sometimes they performed their studies with their mothers. At the end of the five-day period, considerations of a total of 65 mothers who attended to the activity were received via an assessment form that was prepared by researchers. Along with the demographic characteristics, ten open-ended questions were included in the form to evaluate the relevant activities. Some of the research data was analyzed descriptively, while some of it was analyzed by being subjected to content analysis via open coding. At the end of the research, it was concluded that the level of meeting their satisfaction and expectation was high and that the activities which they carried out contributed to both themselves and their children and led them to spend quality time with their children thereafter.

Keywords: Mother, Science teaching, Science and technology club, Early childhood, Out-of-school learning environment

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MOTION CAPTURE AND GREEN SCREEN TECHNOLOGIES IN HIGHER EDUCATION

Büşra Zorba Elçin, Tuba Özarfat

Permanent learning is crucial to construct meaning to and structure the information. Constructivist approach, which supports permanent learning, proposes that each student can structure their own information and experience both individually and socially. At Üsküdar American Academy, we believe in the power of instructional technologies to materialize abstract ideas that take place in the secondary education curriculum. Üsküdar American Academy is the first school at its level to use motion capture technology, which is generally utilized at undergraduate and graduate levels. UAA is aware that processing actions via sensors placed on a human or an animate object and transferring them from the real world into a digital one is important in learning and provides opportunities for students to create a 3D virtual reality. Using this technology, students generate material that support their courses, find an outlet for their creativity and fuel their desire to learn. During this process, the IT department have worked with teachers and students to support them. This study mentions motion capture and green screen application examples and the motivation-learning association generated through behavior forms filled out by students who developed those examples.

Keywords: Motion capture, Greenscreen, Problem solving, Critical thinking, Computational thinking

MOTIVATED STRATEGIES FOR LEARNING IN SCIENCE, ENGINEERING AND MATHEMATICS COURSES

Aytaç Göğüş, Nihat Gökhan Göğüş

This study presents the motivated strategies for learning in three courses from Science, Engineering and Mathematics fields. A survey study was conducted in three courses of an international metropolitan university to investigate university students' motivation and learning styles in science, engineering and mathematics courses. The survey, a self-report instrument, included three parts: Pintrich's MSLQ (Motivated Strategies of Learning Questionnaire) (Pintrich et al., 1993; Büyüköztürk et al. 2004), Kolb's Learning Style Inventory (Kolb, 1985; Akkoyunlu & Aşkar, 1993), and a questionnaire about study habits, motivations, understanding style, and demographics. Achievement goal theory claims that there are many different aims of academic activities to fulfill by students (Pintrich &Schrunk, 1996). This study compares the students' learning style, learning habits with the motivation strategies by using six factors of motivations including control beliefs, intrinsic goal orientation, extrinsic goal orientation, self-efficacy, task value, test anxiety. The study discusses college students' motivational orientations and their use of different learning styles and learning habits for three different courses from science, engineering and mathematics courses.

Keywords: Motivation, Learing styles, University students' learning habits, STEM

MOTIVATING HEALTH AND SOCIAL CARE STUDENTS TO CHOOSE A CAREER IN GERONTOLOGY THROUGH INNOVATIVE EDUCATION

Greet Schoofs, Alice Coffey, Andrea Stitzel, Panagiota Sourtzi, Tihomir Žiljak

Throughout Europe populations are ageing rapidly. This demographic trend presents society with challenges including a growing demand for care and caregivers with specific competencies in caring for

older adults. However, negative attitudes towards gerontology causes failure to recruit professionals in this domain. Research suggests that attitudes towards older people are shaped during education, implying that learning experiences might contribute to the willingness to choose a professional career within gerontology. The European Later Life Active Network, an EU-funded project, focusses on the development of an agreed European Core Competencies Framework for working with older people and on detecting innovative best practices in education to motivate and prepare undergraduates to work in gerontology. Identifying innovative best practices in education for gerontology in Belgium, Ireland, Austria, Greece and Croatia, which could positively contribute to choose for a career in gerontology. A template was developed, using criteria for innovation and the Senses Framework as described by Nolan et al. The Senses Framework is an analytic instrument to interpret students' learning experiences. The template allowed the collection and assessment of teaching and learning methods in order to detect best practices for educating future health care professionals. The template was distributed to Higher Educational Institutions providing education in Gerontology. Twenty-three templates were completed and qualitatively analysed using Nvivo software, the Senses Framework and criteria for innovation. Twenty innovative teaching methods that take into account the needs of students, according to the senses model, were found. Art, sports and integrating the community in the process of learning are few examples. The selected best practices will be disseminated throughout Europe through publication. This research, designed to share good practices and innovative approaches for learning, envisaged that the educational practices identified could positively influence students' attitudes and decisions about working with older people.

Keywords: Gerontology, Innovative teaching, Senses framework

MULTIMODAL REPRESENTATIONS AS A MEANS OF DEVELOPING SCIENCE LITERACY IN YOUNG LEARNERS

Nathan Quarderer, Deborah L. Linebarger

The affordances multimodal representations (MmR) bring to the science classroom include, but are not limited to, motivating student interest, offering increased access to abstract ideas, and facilitating deeper cognitive understanding. When compared with approaches to learning and teaching that depend heavily on traditional, unimodal (text-based) resources, reliance on MmR has been shown to improve student learning across gender, socioeconomic status, race, and language of origin. While a widely agreed-upon definition of science literacy may still be lacking, a leading theory suggests there are two components (fundamental and derived), each deeply rooted in the use of language. Fundamentally, the learner must be able to read, write, and effectively interpret these different modes of communication. Once this objective has been met, the learner can successfully begin deriving the deeper sense of literacy needed to do science. The study described here examines one MmR-reliant approach to learning and teaching (the Science Writing Heuristic – SWH), and the potential this technique has for developing science literacy with attention to young learners (K–2). To better understand these relationships, multimodal science writing samples from 412 students were assessed on the cognitive development of their representations including big ideas in the text, verbs used, picture contents, and cohesiveness between text and illustration. Results suggest fluency with MmR may foster development of science literacy in the fundamental sense as demonstrated by heightened use of verbs describing physical behavior and states of being. Evidence also points to a greater sense of derived science literacy in students using MmR, through greater cohesiveness between text and illustrated representations. A closer look at how these two components of science literacy interact with one another indicates greater cohesiveness between text and illustration (derived literacy) may help contribute to an expanded vocabulary and increased use of verbs (fundamental literacy).

Keywords: Science literacy, Multimodal representations, Writing, Early childhood

MULTIPLE REPRESENTATIONS AS A KEY TOOL FOR THE DEVELOPMENT OF STUDENTS' SELF-CONFIDENCE IN MATHEMATICS: THE CASE OF FRACTIONS

Evgenios Avgerinos, Roza Vlachou

In spite of the fact that analytical programmes change and mathematical school texts adapt to new education needs, students, internationally, continue to have difficulties when handling fractions. The present paper aims to present education practices which within a period of five years were applied by the research team. Our proposals help to reduce the above student difficulties and to develop the student's self-confidence on Mathematics. These teaching practices take into account the results as stated by international bibliographies as well as years of research of our team on rational numbers. They emphasize on multiple representations, use of experiential activities and activities carried out on electronic platforms. Additionally, our proposals are based on methods to reduce the causes of these difficulties. Thus, we question prospective teachers' beliefs on rational numbers, the structure and the context of Greek school textbooks, the curriculum and the instructional practices and approaches of various international researchers. In additional, the present research deepens with semi-structured interviews of the participants. The research is analyzed for five years and it took place in Greece and 1.940 people participated in total. For the analysis of survey data was used Statistical Model implication of Gras using the CHIC software (Cohesive Hierarchical Implicative Classification) (Gras, 1996).

Keywords: Multiple representations, Fractions, Self-confidence, Cohesive implicative classifications, Mathematics

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MUSCULOSKELETAL STRAIN EXPERIENCED BY SECONDARY AND HIGH SCHOOLS STUDENTS DURING TABLET COMPUTER USE FOR EDUCATIONAL PURPOSES

Elif Binboğa Yel, Banu Numan Uyal, Orhan Korhan

The role of technology is gaining significance in educational performance and educational design. Educational ergonomics can be utilized to have positive impacts on the student performance especially on those who use tablet computers for educational means. By pointing out the possible problems aroused as a result of musculoskeletal strain, possible musculoskeletal discomfort experienced by the students could be prevented. Although there are increasing interest on the association between musculoskeletal strain in children and use of technology, the literature on the effect of portable devices used for educational purposes is limited. This study is designed to study potential musculoskeletal discomfort among secondary and high school students during tablet computer use for educational purposes. A survey was specifically designed for this study to investigate the habits and frequencies of tablet computer use, and distributed to 500 students with a response rate of 97,2%. The questionnaire was composed of two parts; first part was derived from the Dutch Musculoskeletal Questionnaire (DMQ), and the second part which included a body map diagram to track the locations of musculoskeletal discomfort. The results of this study are of critical importance in order to identify the risks factors involved in musculoskeletal strain and provide scientific recommendations for healthy use of tablet computers for educational purposes.

Keywords: Tablet, Education, Ergonomics, Musculoskeletal discomfort

NEGOTIATING WHITE SCIENCE IN A RACIALLY AND ETHNICALLY DIVERSE UNITED STATES

Patricia Dunac Morgan, Kadir Demir, Jennifer Esposito

The racial and ethnic makeup of the United States is in constant flux and is expected to experience substantial increases in racial and ethnic diversity over the next four decades. The problem the American educational system face is attempting to problematize race/racism in its educational system and creating a system to counteract educational impartialities present for children of color. The disparity we face grows as teacher education programs graduate primarily White female teacher candidates, who express trepidations teaching students of color. In this paper, we explore specific influences, confines, and conflicts that exist in urban schools, as a starting point to converse about the issues of race in science education and establish a strong theoretical rationale for the continued investigation of a race-based analysis of Culturally Relevant Pedagogy (CRP). Finally, we propose a more inclusive model for teacher preparation programs that embrace and encourage critical conversations about race.

Keywords: Science education, Urban education, Critical Race Theory, Culturally Relevant Pedagogy, Secondary science teachers

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NETWORKING WITH NEW TECHNOLOGIES IN TRAINING OF SCIENCE TEACHERS: A CASE STUDY FROM THE LAYOUT TO THE REFLECTION

Maria Kalathaki

The Major Teachers' Training Program (MTTP) implemented at pilot phase in 2009-2011 by the Greek Pedagogical Institute for teachers of Primary and Secondary Education in five regions of Greece, among them was Mytilene. The program was based on the findings of a survey of the teachers' training needs and focused on the development of flexible training models, such as e-learning, mixed in person and remotely communication, synchronous and asynchronous education etc., by involving new technologies in all school objects. In this paper, the trainer describes the exploitation of New Technologies and Social Networking Web 2.0 in a target based, sustainable and integrative Major Teachers' Training Program (MTTP) at Mytilene. In the training process involved in person and remotely, synchronous and asynchronous encounters of trainees and trainers with Moodle platform for producing Internet-based courses, a blogspot for information, communication and exchange of views and ideas as well as two wikispaces websites for co-formulation of educational material concerning parallel of MTTP activities in local issues "Aristotle and Lesvos" and "Sappho the Educator". Additionally, in the communication contributed emails, skype and telephones. Networking aimed at managing a large volume and consumption of variety of training materials, applying and practicing of innovative methodology for personal and professional development of teachers with consequent improvement of the education provided to their students. The whole project served the strategic objective of the Greek Ministry of Education "New School", with emphasis on the development of horizontal competences of teachers and students, which run across all school subjects and are required in everyday educational practice.

Keywords: Science teachers' training, Secondary science education, Information and communications technologies, Greek major teachers' training program

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OBJECTIVES OF PHYSICS TEACHER CANDIDATES TO DESIGN 3D MATERIAL AND PROBLEMS THEY ENCOUNTERED IN THE PROCESS

Güner Tural, Demet Tarakçi

The aim of this study was to determine objectives of physics teacher candidates to design 3D material, problems they encountered in the process and their views about contribution of their materials to subject and course process. The working group of the study was 15 physics teacher candidates that received instructional technology and material design course. Aim oriented interview form that contains three questions was developed. Semi-structured interviews were conducted with teacher candidates. The obtained data were presented on the basis of qualitative data analysis. It was determined that physics teacher candidates prepared their 3D materials mostly to eliminate misconception about the subject and to make the subject more understandable. In this process, the problems that physics teacher candidates mostly stated were to provide necessaries to serve the purpose and construction of material.

Keywords: 3D material, PHYSICS teacher candidate, MATERIAL design

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OBSERVATION OF RELATIONSHIPS BETWEEN THE SELF-REGULATED LEARNING SKILLS AND INTERNET USAGE SELF-EFFICACY WITH THE APPLICATIONS OF IUVIRLAB

Fatma Gülay Kirbaşlar, Elif Ince, Zeliha Özsoy Güneş, Yavuz Yaman

The objective of this study is the observation of relationships between the self-regulated learning skills and internet usage self-efficacy with the applications of virtual laboratory system of Istanbul University (IUVIRLAB). Quantitative research method has been applied in this study. Post-test model with an experiment and control group of experimental design is used. The sample of the study is formed by teacher candidates who are freshmen of Science Education department and they all completed the class of General Physics I and General Physics Laboratory I. In experiment group, experiments are performed with IUVIRLAB system while control group experiments were made with traditional methods. Data collection tools are: Educational Internet Use Self-Efficacy Beliefs Scale (EIUSBS) developed by Şahin (2009) and Self-regulated Learning Skills Scale (SLSS) developed by Turan (2009). The scale is made up of 4 factors. They are: "Action for motivation and learning", "Planning and defining an aim", "Following a strategy and evaluation" and "Dependence in learning". For experimental group, system of IUVIRLAB; developed by İnce et al. (2014) is used and traditional General Physics laboratory is used for the control group. Four magnetic field and magnetism experiments are chosen among Physics Laboratory application studies. IUVIRLAB system includes interactive, multi user models designed according to the active learning methods and multi admin qualities. SPSS 19.0, t-test and Pearson Correlation Coefficient Analysis is used. As a result of data analysis; as for EIUSBS total score, the difference between the arithmetical averages of experiment and control groups is not statistically meaningful. Between SLSS total score and the factors like motivation and action to learning, planning and determining aims, using and assessment and lack of self-directedness, there has been a statistically meaningful difference in advantage of experiment group. All the correlations among EIUSBS, SLSS and the factors are defined as positive direction and meaningful.

Keywords: Virtual laboratory, Self-regulated learning skills, Internet usage self-efficacy.

OPINIONS AND ATTITUDES OF PROSPECTIVE TEACHERS FOR THE USE OF TECHNOLOGY IN EDUCATION

Fatma Alkan, Canan Koçak Altundağ

Education is not only limited teaching the students according to prescribed syllabus as a specific school level. It has much border objectives, goals and other concepts. Thus, education is becoming an increasingly important tool to combat poverty and to establish a modern nation. Feature of modern society is the penetration of information technologies in all spheres of life, including schooling. In general, the new technologies have been recognized to play a valuable role in developing and improving the teaching and learning situations. Today using technology has become an obligation, not a privilege. Because we reach more quickly to news, information or progress with technology and it facilitates our daily lives. Technology changes on a daily basis, and just like it is in daily life, it can be used in response to the needs of education and instruction settings. This study aims at examining the attitudes of the prospective teachers towards the role of technology and the use of technology in education. The model of this research is "Based on Survey Model". The study group of the research consists of 138 pre-service teachers who are enrolled at Hacettepe University, Faculty of Education. The attitudes of the pre-service teachers on the role of technology in education-instruction activities are determined by the assessment developed by Çil (2008). The attitudes of the trainee teachers towards educational technology are determined via the "Attitude towards the Use of Technology in Education Scale" developed by Öztürk (2006). In general, it has been found out that the attitudes of pre-service teachers towards the importance of technological equipment as a teaching tool in education are positive. In other words, statistically significant differences have occurred in attitudes of pre-service teachers towards the role of technology.

Keywords: Prospective teachers, Using technology in education, Attitudes

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OPINIONS OF PRE-SERVICE SCIENCE TEACHERS ON THE CHEMISTRY LABORATORY II

Hülya Kahyaoğlu, Zehra Molu, Ela Ayşe Köksal

In science education laboratory is a teaching method that provides meaningful learning of concepts, permanent learning, and working individually or in groups for students. Applications such as laboratory constitute the basis of scientific studies. Since students actively participate in experimental work in the laboratory, their views related to laboratory courses become important. This study was conducted in order to determine pre-service science teachers' views on General Chemistry Laboratory II course. Qualitative research model was used in the study. The study was conducted with 46 students who are in their first year in science teacher education department at a university in the spring semester of the 2014-2015 academic year. 14 open-ended questions prepared by the researchers were asked to the students participating in the study. The answers to the questions were analyzed with descriptive analysis. Analysis conducted by coders was found to be highly compatible with each other. According to the findings, of the experiments conducted in the laboratory only soap making was associated with everyday life. Being in their first year, not doing laboratory practice during the elementary and secondary education students had difficulty to relate experiments to everyday life. Students have expressed the need for preparation. The majority of students take the view that their experiments in the laboratory are instructive. Because they stated that they apply what they see in the theoretical knowledge of general chemistry course, they establish the connection with everyday issues and they win dexterity. Students reported both positive and negative emotions regarding laboratory. Positive emotions were described as being happy to try, taking pleasure from the experiment, and curiosity. On the other hand, negative emotions were expressed as the fear of not performing the experiment, the anxiety of giving wrong answer verbally, and long lasting and difficult experiments. All of the students believe that they can install the experimental setup for most of

the experiments. All of the students stated that they comply with the general rules of the laboratory. The majority of students reported that they did not encounter with a negative situation in the laboratory. Few students stated that they should repeat some experiments, and they could not find the results of the experiment. Students think positively about the instructor and stated that she is a good guide during the experiment, tries to help it, is informative, gives feedback, and helps to discuss the results. Students have stated that they work in harmony with the group friends, and the working group should be three-six persons. Most of the students at the end of the experiment reported a positive opinion for the report. This study showed that students are not very curious and eager in the laboratory. Students face problems as they try to relate experiments to their daily lives because they could not make sufficient tries in high school. Experiments should be fun against boredom, be striking, and in some dangerous experiments robot should be utilized. Instructors who give laboratory course at university can make common laboratory practices with science teachers in secondary schools, and university laboratories should be utilized for this purpose. The authors have received positive feedback from the students and teachers after doing a similar application with the students in high school and arts and science centre in Nigde.

Keywords: Chemistry laboratory, Pre-service science teachers, Opinion

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PERCEPTUAL INTERFACES FROM THE PERSPECTIVE OF HUMAN-COMPUTER INTERACTION AND ITS USE IN EDUCATION

Neşe Gürbulak, Esad Esgin

The human-computer interaction is a hot topic because of the considerable increase in the production and use of information and communication technologies. In this interaction context, new generation interaction styles have emerged by the constant advancements in the technology. One of these interaction styles is perceptual interfaces that contain different kinds of high level natural interaction. This interaction is based on natural human-human interaction style like gestures, touching and speaking. The purpose of this research is that to examine perceptual interfaces in the perspective of human-computer interaction and infer some results about how to use them in education and offer suggestions about it. In this study, interaction design of the perceptual interfaces was discussed according to the reviewed literature. Also motion-based technologies, used in these interfaces, were presented and use of these technologies in the field of educational technologies was examined. It is considered that the results of the study can provide guidance to researchers and practitioners. There are many types of perceptual user interface interaction. Today, the most popular application area of the motion-based technology is Kinect technology. This technology includes a variety of perceptual interaction such as; image viewing, skeletal detection and monitoring system. Kinect technology is one of the most popular devices in the field of image processing technology that can detect movements and send these to computers. Kinect technology was developed by Microsoft to play digital games with Xbox console and it has been used in other areas as time goes by. Although this technology originally developed for digital games, it has often begun to be used in scientific researches by the capability of catching depth of an image. By considering that perceptual interfaces can provide natural interaction to individuals like in their social life, users can exhibit their skills without extreme cognitive load and they can learn easier via perceptual interfaces. In this context, it is envisaged that perceptual interfaces can support learning by providing ease of use and control.

Keywords: Natural user interfaces, Perceptual interfaces, Motion based technologies, Kinect technologies, Educational technologies

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PERSPECTIVES OF UNDERGRADUATE STUDENTS ABOUT POSTGRADUATE EDUCATION

Cemalettin Yildiz, Resul Göl

Nowadays, demand for postgraduate education is increasing so the necessity to determine undergraduate students' perspectives to postgraduate education is revealed. Thus, the aim of this study is to determine the perspectives of 4th grade mathematics students studying at faculty of arts and sciences and faculty of education about postgraduate education. In the study, qualitative research design was used. 129 undergraduate students participated in the study on fall term of 2015-2016 academic year. 69 students of them were from a faculty of arts and sciences and 60 of them were from a faculty of education. A form including open ended questions were used to gather the data in the study. Data obtained were analyzed by descriptive and content analysis techniques. At the end of the study, it was found that 50,4% of the students did not want to get a postgraduate education, 41,1% of them wanted to get a postgraduate education, and 8,5% of them did not have an idea about this subject. Also, it was found that students wanted to get a postgraduate education to have much salary, to specialize in the fields, to make academic career, to improve oneself, and since they thought that being assigned as a teacher was more difficult. In addition, the most important reasons for some students who did not have an ambition or attempt to get a postgraduate education were found as they want to be a teacher, they thought they wouldn't have enough time to get postgraduate education, and they would have financial problems. Lastly, it was determined that students were offered to get a postgraduate education by their relatives, friends, and educators and they got information about postgraduate education mostly from their educators, friends, and internet.

Keywords: Mathematics education, Postgraduate education, Teaching profession, Academic career

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PORTFOLIO ASSESSMENT OF SCIENCE LABORATORY : THE SAMPLE OF CONCEPT PERCEPTION

Nisa Yenikalayci

The goal of this study is to assess activities which are made about concept perception studies involving in portfolio which are prepared by life sciences teaching candidates in Science Teaching Laboratory Applications-II course. The research's participants consist of 28 science education teaching candidates who are at the third grade of a state university in black sea region. The content analysis has been made as constituted individual activity folders have been gathered after 4-weeks study. Activities which are made in lesson involve in the concept of activity folder. Activities which are made have been selected as sample from secondary education Physics-11 . grade lesson's book which is published by The Ministry for Natural Education. It has been paid attention that activities which are chosen are related to astronomy. Only, concept perceptions have been assessed from activities which are gathered in portfolio folders of students. Data has been analyzed as codings are made and descriptive statistic findings have been presented. Firstly some pictures (star, comet, planet, constellation, meteor, light - year ...) are indicated to students and then they are asked to make definitions about concept perception. Then a form which involves concept and explanation has been given to students. Students have marked that issued explanations are appropriate for whichever concepts. It is thought that puzzle is important on the development of connections among concepts. In order to determine whether students make or do not make pattern among concepts, students have been asked to prepare puzzle in the lesson for 4 weeks. It has been seen that students prepare crossword puzzle and vocabulary game puzzle individually. Consequently, the study has been ended with various suggestions related to the change of concept perception.

Keywords: Science education, Portfolio, Concept perception, Astronomy

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PRE-SERVICE MATHEMATICS TEACHERS PERCEPTIONS ON THE CONCEPT OF VISUALLY IMPAIRED INDIVIDUAL

Tuğba Horzum

The aim of this study is to determine the perceptions of pre-service mathematics teachers about the concept of visually impaired individual. The study group consists of 35 volunteer pre-service mathematics teachers at a state university at the 2015-2016 academic year. In this study having qualitative nature, to determine the perceptions of pre-service mathematics teachers about "visually impaired individual" two open-ended question have been asked. With the second question, they have been asked to draw the visually impaired individual in their own environment. In the analysis of data: frequency, percentage and content analysis techniques were used. The present study, which is an ongoing research in which I conduct content analysis, students' perceptions that occur will be discussed in relation to literature.

Keywords: Visually impaired individual, Pre-service mathematics teacher, Perception

PRE-SERVICE PRIMARY TEACHERS AND PRE-SERVICE SCIENCE TEACHERS' VIEWS AND EXPERIENCES REGARDING TEACHING PROCESS IN PLANETARIUM: THE SAMPLE OF POLATLI CITY SCIENCE CENTER AND ULUG BEY PLANETARIUM

Filiz Demirci, Pinar Özdemir Şimşek

In this study, it was aimed at investigating the perceptions of classroom and science teachers candidates related to the teaching process held in Science Center and Uluğ Bey Planetarium in Polatlı. In this study, among qualitative research designs, holistic single case descriptive study was used. 11 pre-service teachers, 4 of them from science, 7 of them from class room teachers were participated in the study. As data collection instruments, semi-constructed interview form, semi-constructed observation form and document analysis were included in the study. To analyze the obtained data, content analysis was used. Data obtained from observation and interview transcripts were related to the research problems of the study and then they were transcribed and analyzed based on themes and categories. Based on the interviews carried out with preservice teachers, it can be concluded that preservice science and classroom teachers stated that the learning process was effective for them especially to conceptualize their priorknowledge, by adding new knowledge on their learning. Furthermore, they stated that they found planetarium as an interesting place to visit and they felt like they were inside of it and they found all visualizations very realistic. For their opinions about the educator who is responsible from education in planaterium, they clarified that educators are specialized in their work in terms of content but they wanted to learn more and so they did not find the education sufficient. As a result of observation data, it is obvious that the educators in planaterium gave scientific responses to the questions of preserviceteachers, and they mostly used explanations and analogy as a teaching strategy in their education. Also, related to the simulations presented in planateirm, preservice teachers stated that simulations were effective as a teaching material as they include 3 dimension by facilitating the knowledge to be concrete, but as they include lots of academic concepts, they are more suitable for elementary or uppergrades. Based on document analysis, it can be also concluded that simulations in planaterium were mostly related and suitable for secondary grade astronomy and space science objectives. Therefore suggestions were given at the end of the study.

Keywords: Astronomy education, Pre-service primary teachers, Pre-service science teachers, Planetarium, Qualitative research

PRE-SERVICE SCIENCE TEACHERS' MISCONCEPTIONS ABOUT DIFFUSION AND OSMOSIS

Çiğdem Çingil Bariş, Zeliha Özsoy Güneş, Burçin Acar Şeşen

Diffusion and osmosis are important concepts that facilitate to understand many important life processes. Diffusion is the primary way for short distance transportation in a cell and the cellular system. An understanding of osmosis concepts is key to comprehending water uptake by plants, water balance in soil and aquatic creatures, turgor pressure in plants, and transport in living organisms. Additionally, diffusion and osmosis are closely concerned with the basic concepts in physics and chemistry such as permeability, solutions, pressure and particulate matter. Therefore, it is quite important for the students, especially pre-service science teacher, to diagnose their misconceptions about the concepts, which will enlighten many subjects. In the light of this reason, the aim of this study is to determine pre-service science teachers' understanding of the concepts of diffusion and osmosis by using a two-tier diagnostic test developed by Odom and Barrow (1995). The test was applied on 198 pre-service science teachers attending in a public university in İstanbul. Results revealed that pre-service science teachers had a considerable degree of misconceptions concerning diffusion and osmosis.

Keywords: Misconceptions, Diffusion, Osmosis, Two-tier diagnostic test

PRE-SERVICE SCIENCE TEACHERS' VIEWS TOWARDS SOCIOSCIENTIFIC ISSUES

Sibel Er Nas, Hava Ipek Akbulut

The aim of this study is to uncover pre-service science teachers' views about socioscientific issues. Case study research method was used in the study. This method focuses on a particular case and gives oppurtunity to examine one part of the problem of the study depthly. The sample of the study consisted of 152 pre service science teacher. An open ended questionnaire and interviews are used to gather data. Open ended questionnaire applied to 152 pre-service teachers while interviews are conducted with 7 pre-service science teachers on a voluntary basis. Open ended questionnaire consist of 3 questions. Interviews were recorded with recording devices. Interviews done with each of the pre-service science teachers took about twenty minutes. Pre service science teachers participated to questionnaire are coded as S1, S2, S3,....,S152. Data obtained from questionnaire and interviews were analyzed descriptively. In the analysis of survey data tables have been created within the framework of the common perceptions of pre-service science teachers. Frequency and percentiles are utilized in the creation of the tables. At the end of the study it has seen that most of the pre-service science teachers expressed socioscientific issues as nuclear energy, global warming and cloning.

Keywords: Socioscientific issues, Pre-service science teachers, Case study.

PRE-SERVICE TEACHERS' PLAUSIBILITY PERCEPTIONS AND UNDERSTANDING OF GLOBAL CLIMATE CHANGE

Gaye Defne Ceyhan, Ebru Zeynep Muğaloğlu

As the world becomes more inter-connected, people started to face with global challenges such as global climate change (GCC). Overcoming the challenges on GCC requires all citizens to have a better understanding. One of the fundamental variables in developing conceptual understanding is plausibility. This study aims at investigating the relationship between pre-service teachers' plausibility perceptions and understanding of GCC. Survey research design was conducted to answer the research question. The sample of the study includes 199 senior pre-service teachers from the Faculty of Education at a public university in Istanbul, Turkey. The study was carried out during the spring semester of 2015. Data collection instruments were Understanding of GCC Instrument and Plausibility Perceptions Measure (PPM). The aim of PPM was to determine participants' plausibility perceptions on evidences for GCC, evidences for supporting human link to GCC and predictions about future impacts of GCC. The aim of understanding of GCC instrument is measuring understanding of participants on the physical scientific aspects of the climate system, causes of GCC and predictions about future impacts of GCC. Descriptive analysis was conducted to examine participants' plausibility perceptions and understanding of GCC. Pearson's correlation analysis was run to assess the relationship between participants' plausibility perceptions and understanding of GCC. Results revealed that participants have high plausibility perceptions and understanding of GCC. However, participants had some common misconceptions such as associating ozone layer depletion with GCC. Results also showed that there was a significant, moderate positive correlation between participants' plausibility perceptions and understanding of GCC, $r(197) = .491$, $p < .0005$. The findings will be discussed in conjunction with related literature. The results of this study presented implications and suggestions for teacher educators, environmental educators and climate change education researchers.

Keywords: Conceptual change, Plausibility, Understanding, Climate change

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PRESERVICE CLASSROOM TEACHERS' BIOETHICAL PERCEPTIONS

Gülbin Özkan, Ünsal Umdu Topsakal

Recent developments in biology and biotechnology have raised ethical issues. In order to live in more ethical world, it is most important to improve preservice teachers' capacity to make ethical decisions. The purpose of this research was to determine preservice classroom teachers' perceptions about bioethical issues. The research was conducted with 40 preservice class teachers (35 females, 5 males) from Yildiz Technical University, Faculty of Education, Department of Classroom Education in 2015-2016 academic year. In this study qualitative research method was used. For this purpose four bioethics scenarios was developed by the researchers and applied. The participants wrote their decisions about each scenario that included bioethical issues. The data was treated by qualitative data analysis - open coding. As a consequence of this research, it has been revealed that classroom teachers have decided mostly by their beliefs such as religious rather than bioethical perspective. At the end of the research, some suggestions were made concerning to have bioethics subjects in lessons, and to arrange preservice education for classroom teachers.

Keywords: Bioethics, Bioethical issues, Biotechnology, Preservice teachers

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PRESERVICE ELEMENTARY MATHEMATICS TEACHERS' CONCEPT IMAGES FOR SEQUENCES

Fatih Karakuş, Zeynep Bahar Erşen, Nimet Pancaroğlu

A sequence is defined as a function on the positive integers into real numbers. The concept of a sequence and its limit has significant impact on the related concepts in mathematics. In the research literature, there are also a few studies related to the students' understanding about the concept of sequences. In this context, the aim of this study is to determine preservice elementary mathematics teachers' concept images for sequences. The study was conducted with 38 freshmen preservice elementary mathematics teachers with the use of a two-part open-ended questionnaire consisting of 10 questions prepared through a literature review. Two dimensions of preservice elementary mathematics teachers' concept images are examined: defining and determining of the sequences, finding limit of a sequence.The data were categorized in terms of descriptive analysis and analyzed qualitatively.As a result of the study, while freshmen preservice elementary mathematics teachers have not difficulty about defining and determining of the sequences; they had wrong concept images for exploring the limit of the sequences.

Keywords: Sequences, Concept image, Preservice elementary mathematics teachers

PRESERVICE ELEMENTARY TEACHERS' VIEWS OF CAUSES OF ACCIDENTS OCCURED IN THE LABORATORY

Cemil Aydoğdu

The purpose of the study is to determine preservice teachers' views of causes of accidents occurring in the laboratory. In the study phenomenology design was used. Participants were made up of 59 pre-service elementary teachers attending . To determine preservice teachers' views about causes of accidents in the laboratory, semi-structured interview form was used. Data were analyzed with the content analysis. The research results demonstrated that preservice teachers have expressed many reasons for accidents occurring in the laboratory. According to preservice teachers problems in the laboratory are teacher, student, laboratory, chemical-material and experiment. Considering the research results, some recommendations could be developed.

Keywords: Science education, Causes of problems encountered in laboratories, Contet analysis

PRESERVICE SCIENCE TEACHERS' CONCEPTUAL FRAMEWORKS REGARDING DENSITY

Seyit Ahmet Kiray

Scientists define density as the mass of a substance per unit volume. Density cannot be directly perceived or measured. Because of this reason, students have some misconceptions and misunderstandings about the concept of density. The purpose of this study is to investigate preservice science students' conceptual frameworks regarding density. Datas are collected 73 participants using a free Word association test. The word association test is one of the oldest educational tools for investigating the cognitive structure of learners. The results of this study showed that the preservice science students generated many ideas related to density concepts.

Keywords: Density, Science education, Physics

PRESERVICE SCIENCE TEACHERS' CONCEPTUAL FRAMEWORKS REGARDING GRAVITY

Seyit Ahmet Kiray

The concept of gravity was introduced by Newton. Before Newton, no one had heard of gravity. Newton's law of universal gravitation states that every mass attracts every other mass in the universe. The gravitational force between two bodies is proportional to the product of their masses, and inversely proportional to the square of the distance between them. In 1915, Einstein had dreamed up an agent that caused gravity and developed a new perspective for gravity concept. The purpose of this study is to investigate preservice science students' conceptual frameworks regarding gravity. Datas are collected 73 participants using a free Word association test. The word association test is one of the oldest educational tools for investigating the cognitive structure of learners. The results of this study showed that the preservice science students generated many ideas related to gravity concepts.

Keywords: Gravity, Science education, Physics

PRESERVICE SCIENCE TEACHERS' VIEWS ON THE SOCIAL RESPONSIBILITY OF SCIENTISTS

Ümit Duruk, Abuzer Akgün, Fatma Gülsuyu

Within the disciplines of science, the terms such as scientific literacy and nature of science are unable to bring together at least some of the scientists, philosophers and science educators to agree on a common descriptions embedded in science is a complex endeavor and subject to change with new evidence. In the near past, scientific knowledge were described in various explanations as absolute knowledge based on observation and experiment. In contrast, contemporary science approaches put emphasis on the vision that science needs to be purified from traditional beliefs result in undesirable views in common. This change, in turn, manifests itself within the views and beliefs toward scientists. The social responsibility of scientists regarding nature of science should be revised on account of the changes in the scientific approaches. Because students, teachers and even scientists possess naive understandings on science and its processes given in the social context. The purpose of this study was to explore the beliefs of preservice science teachers on the responsibility of scientists. As data collection tool, a scale developed by Röhm and Rollnick (2010) was used after the revision of two language experts and their semantic and grammatical corrections of the statements in the final form of it. Data were collected from a sample of preservice science teachers enrolled in a state university. In conclusion, the present study revealed that scientists should provide a standard of living and develop it, give particular importance on public security, perform their workings perspiciously and pay attention to moral values prevailing in this process, and finally science teaching should not be limited to invariant knowledge in the books used in the courses. On the other hand, the point on which everyone should think and emphasize is that preservice science teachers suppose a gender inequality in favour of male scientists and have an opinion of scientists are not responsible for negative or adverse effects of their inventions.

Keywords: Nature of science, Scientists, Social responsibility

PRESERVICE TEACHERS' ASSESSMENT OF KINDERGARTEN STUDENTS' UNDERSTANDING OF SUBTRACTION PROBLEMS

Murat Akarsu, Lizhen Chen

A challenge for pre-service teachers (PSTs) is to determine what students know about a topic through asking appropriate questions. This article examines PSTs' understanding of kindergarteners' subtraction strategies and overall subtraction understanding. We examined four pre-service teachers' individual interviews with four kindergarten students at an elementary school to assess students' subtraction understanding. Drawing on their plans, interview transcripts, and reflection papers, the data suggests that PSTs' wording of subtraction questions, their sequences of asking these questions, and their strategies of reframing these questions interact with students' problem-solving strategies, and uncover varying amounts of students' subtraction knowledge. Results of this indicate the importance of helping PSTs learn how to dig into students' subtraction thinking and provide insights into areas where PSTs' instructors can improve pre-service training.

Keywords: Student thinking, Questioning, Rejoicing, Prompting

PRESERVICE TEACHERS' PERCEPTIONS OF EQUITABLE ASSESSMENT: A METAPHORICAL STUDY

Kemal Izci, Rahime Filiz Kiremit

Teachers more need to serve for all students than before because contemporary schools are different places. In today's schools cultural, social and language diversity is in advanced stagethe due to increasing influx of refugees, immigrants and migrants. Thus it cricual for teachers to consider all students to provide equitable instruction (Darling-Hammond, 2006). One of the difficulties teachers face in providing equitable instruction is to elicit and assess student learning. Therefore, it is important for teachers to percieve and understand equitable assessment to support all students' learning. In Turkey also the demographics of schools have greatly changed due to the influx of refugees and migration occurred recently. Nowadays, we more need to prepare teachers who understand and use equitable instruction and assessment to limit the negative impact of the demographic changes on students' achivements. Therefore, this study aims to understand preservice teachers' perceptions of equitable assessment. To this end, methafors one of the phenamological design in qualitative research was employed to understand participants' perceptions of equitable assessment in terms of equity and fairness. Data were collected through a tool that asked participants to complete the following sentences: "Equitable assessment is/like…. because…" and "Fair assessment is/like……becasue …..". Participants were 80 preservice teachers studying at the departments of Turkish Language (32), Mathematics (24) and Computer and Intructional Technology (24). Content analysis was used to analyze collected data. Participants developed 42 different methafors for equitable assessment and 32 methafors for fair assessment. Most of the methafors were focused on the role of teachers, students, assessment tools, and teaching process. Participants' methafors for equity as well as fairness mostly highlighted objectivity, individual differences, discriminant feature and out of class factors. In conclusion, participants percieved equity and fairness as very similar and thought their purposes as providing objectivity and considering individual differences in assessment.

Keywords: Equitable assessment, Fair assessment, Metaphor

PRIMARY SCHOOL TEACHER EDUCATION STUDENTS' VIEWPOINTS ON VEGETATIVE SATATE

Ramazan Çeken

Vegetative state known as a medical event is usually confused with brain death and coma. It is widely seen among the public. Therefore, this study mainly based on the Primary School Teacher Education Students' (PSTES) Viewpoint on vegetative state. The study was applied to the 18 PSTES attending at Ağrı İbrahim Çeçen University. They are at the fourth grade of their bacheleres degree. The participants wrote their opinion on a sheet. The analysis to reach valuable categories was made according to this written data using content analsis technique cited in literatüre as one of qualitative methods. With the evaluation of the data obtained from 18 PSTES, it is understood that only 4 participants explained that the brain could not perform the thinking ability as the cortex culd not perform the basic anatomic rule during the vegetative state. 9 of PSTES identified that it is related to movement of the human body. 10 students have the idea that it has a relation with the functions of brain. Vegetative staate is explained in Turkish dictionary as a unconscious and static state of the body as well as medical literatüre. The misconceptions mentioned above stem from semantic extention, semantic restriction and misinformation.

Keywords: Vegetative state, Misconception, Brain death, Semantic extention, semantic restriction

PROBING HIGH SCHOOL STUDENTS' COGNITIVE STRUCTURE ABOUT PHYSICAL AND CHEMICAL CHANGES THROUGH WORD ASSOCIATION TEST

Canan Nakiboğlu

The examination of students' cognitive structure is important for probing what learners know about a topic before their instruction. In addition, visualizing students' cognitive structures is essential for understanding how students understand a previously taught subject. The subject of the physical and chemical changes is one of the basic and essential issues of high school chemistry curriculum and also is related to daily life. To add, the subject is taught at the middle school level. On the other hand, it is stated that students have learning difficulties and misconceptions concerning identification of the physical and chemical changes. The aim of this study is to investigate high school students' cognitive structures and to identify their learning difficulties in physical and chemical changes through word association test (WAT) and to compare at different students grades. WAT is one of the commonest methods for investigating students' knowledge structure and it can reveal the learners' mental model of world, verbal memories and thought process. The study was comprised of 189 students who are attending at ninth (88 students) and tenth grades (101 students). The WAT was used as data a collection instrument developed by the researcher. Before WAT is developed, the physical and chemical change topic placed in high school chemistry curriculum was examined to select the stimulus words of WAT. The WAT comprised of eight total stimulus words, among them chemical reaction, energy, chemical property, and physical property, is used to probe students' cognitive structures. At the end of study, it was found that differences in the students' cognitive structures at ninth and tenth grades make it clear that instruction affects the cognitive structure. On the other hand, it was also concluded that students from both grades cannot associate with the concept of energy with other concepts of the subject.

Keywords: High school students, Cognitive structures, Physical and chemical changes, WAT

PRODUCTIVE STRUGGLE IN A GEOMETRY COURSE

Zülfiye Zeybek

Prior studies suggest that learning with understanding only occurs when students engage in high levels of mathematical tasks and struggle to make sense of mathematical ideas (Hiebert and Grouws, 2007; Smith and Stein, 1998; Warshauer, 2015). Even though the idea of "struggle" is seen essential to intellectual growth, how it looks like among college students and in college classrooms and how it can be productive has not been addressed explicitly. This study uses an episode from a geometry classroom at a public university in order to address: (1) how pre-service middle grade students (PSTs) were engaged in a task (doing mathematics) and how the cognitive level of the task was maintained and (2)how PSTs' struggled and how their struggle was addressed by the instructor during instruction. Participants consist of 48 PSTs who are in their junior year of college in Turkey and their instructor. Individual interviews were conducted with 16 PSTs prior to task implementation in order to assess their existing conceptions and/or misconceptions regarding to geometric shapes and area/perimeter as well as their struggles during this process. Additionally, a classroom session in which a designed task, which was called a cake task, (coded as doing mathematics) was implemented was video taped. The interviews were audio-taped and both the interviews and the class video were transcribed. Warshauer (2015) suggest several types of struggles such as getting started or carry out a procedure in math classrooms, which was used to categorize PSTs' types of struggles during individual interviews and task implementation. Smith and Stein (1998) categorized mathematical tasks among four levels as: (1) memorization, (2) procedures without connection, (3) procedures with connection and (4) doing mathematics.These levels were used to code the level(s) of the cake task as designed and during enactment in this study. The results of this study revealed various misconceptions and types of struggles among PSTs which will be shared with audience in details.

Keywords: Productive struggle, Geometry, Pre-service teachers, Misconceptions

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PROJECT-BASED LEARNING IN MECHATRONICS ENGINEERING: MODELING AND DEVELOPMENT OF AN AUTONOMOUS WHEELED MOBILE ROBOT FOR FIRE FIGHTING

Atef Ata

The mechatronics engineering education has advanced rapidly since the introduction of mechatronics as a new discipline in engineering education. The project-based learning becomes also one of the most effective approaches in teaching mechatronics subjects such as robotics and mechatronics system design. The main objective of this paper is to present the role of project-based learning in the mechatronics engineering education. An autonomous wheeled mobile robot that scans a rectangular area looking for a heat source (simulated by a burning candle) extinguishes it and returns back to its home position is designed. The project was developed successfully and the students got the second position in a robotic competition organized by the university. The design details as well as the performance analysis of the mobile robot will be presented here. Also, the milestones of the project will be discussed and analyzed.

Keywords: Mobile robot, Firefighting, Competition, Project-based. Mechatronics education

PROMOTING LEARNER AUTONOMY THROUGH CLIL CLASSES IN HIGHER EDUCATION

Ljiljana Marković, Zorica Prnjat

In this paper, we present a CLIL module that combines teaching of English and content related to environmental and geosciences. This is an experimental CLIL module devised and implemented at the Faculty of Geography, University of Belgrade with the second-year students of the Environmental Sciences Department and Geography Department. The organization and development of the module was conditioned by the students' needs, motivation and interests, their foreign language proficiency and their prior education. The main objective of the module was to promote learner autonomy. Students themselves selected the topics they wanted to study. The general themes were climate change, environmental devastation and water scarcity. Students had to find information on these issues and come up with possible solutions, which they presented to their classmates. They were assigned to write an essay on a selected topic and prepare a presentation for the class. Unlike teacher-centered environments in which students are given grades, in this CLIL module the assessment was performed by the students themselves. They examined their own learning, monitored their progress and evaluated the achievement together with their classmates.

PROPERTIES OF EDUCATIONAL GAMES FOR MATHEMATICS: IOS APPLICATIONS FOR ARITHMETIC OPERATONS

Ayfer Alper, Ihsan Balkan

IOS Applications for game based Mathematic Education is also widely used. In this study IOS Applications for "Arithmetic Operations" were selected from App Store and they were analysed in order to evaluate its usefulness for teachers and students. The twenty five free applications were selected and analysed depending on some criteria.

PROSPECTIVE ELEMENTARY MATHEMATICS TEACHERS' CONTEXTUAL, CONCEPTUAL, AND PROCEDURAL KNOWLEDGE: ANALYSIS OF SELECTED ITEMS FROM THE PISA

Utkun Aydin Aydin, Meriç Özgeldi

The aim of this study is to investigate the difficulties, which Turkish prospective elementary mathematics teachers have in solving the Programme for International Student Assessment (PISA) 2012 released items. Data were collected from 52 teacher candidates through a 26 item-written test. The data indicated that PISA items could be categorized according to whether they require contextual, conceptual or procedural knowledge. Analysis of data also indicated that the participants encountered problems mostly in items requiring the combined contextual, conceptual, and procedural knowledge. Although many of the participants could produce correct answers for procedural knowledge items, several could not, and few were able to give mathematical explanations and make appropriate estimations for conceptual knowledge items. The results lead us to conclude that the prospective teachers' contextual knowledge was generally

fragmented, and that the role of the type of mathematical knowledge identified by PISA items should be explored with particular attention to the function of contextual knowledge. Implications for teacher education related to the findings of the study are discussed.

Keywords: Contextual knowledge, Conceptual knowledge, Procedural knowledge, PISA items, Preservice teachers

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PROSPECTIVE ELEMENTARY SCHOOL TEACHERS' PROBLEM POSING SKILLS IN ADDITION-SUBSTRACTION WITH NATURAL NUMBERS

Ömer Şahin, Murat Başgül, Bilal Öncü

According to Renewed Middle School Mathematics Curriculum problem solving is one of the most important mathematical skills ☐MEB, students it is necessary to pose proper problems in accordance to the nature of concepts. The most important task in providing it falls to teachers who perform the learning activities (Işık, 2011). In this context the purpose of the study is to examine prospectıve elementary school teachers' problem posing skills in addition-substraction with natural numbers. 30 first grade, 44 second grade, 36 third grade and 38 fourth grade prospective teachers constitute the participants of this study. Explanatory-confirmatory, one of the mixed research methods, was used as the research design of this study. İn this research method firstly quantitative findings are obtained. To support and understand more deeply qualitative findings the help of quantitative data is used (Johnson ve Christensen, 2004). In this context, in the study as the data tool problem posing test, constructed by the researchers, which is composed of open-ended expressions was used. The problem posing test is composed of 7 mathematical expressions in the form of □+4=15. After the test application Semi-structured interviews were conducted to more detailed analysis the proplem posing process. At the end of the study it was observed that the prospective teachers have diffuculties in posing problems in addition-substraction with natural numbers. Also it was determied that the prospective teachers were not careful about the position of symbols in the mathematical expressions of the problems they posed.

Keywords: Prospective elementary teachers, Problem posing, Addition, Substraction

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PROSPECTIVE HIGH SCHOOL SCIENCE TEACHERS' REASONING IN SELECTING AND EVALUATING FORMATIVE ASSESSMENTS

Kemal Izci

Achieving the goal of meaningful science learning demands science teachers to formatively use classroom assessments to make informed instructional decisions to support learning (e.g., Abell & Siegel, 2011). Thus, prospective teachers must be educated to successfully use formative assessment to elicit, assess, and interpret students' understanding and systematically use that understanding to design instructional practices (e.g., Buck et al., 2010). Regrettably, many prospective teachers get their teaching certificate without having an understanding of effective use of assessment to inform teaching and support learning (e.g., Siegel & Wissehr, 2011) and have difficulties on selecting appropriate assessments to achieve their own aims (Yilmaz-Tuzun, 2008). Moreover, there is little research (Tomanek et al., 2008) that focuses on prospective teachers' reasoning in selecting and evaluating formative assessment tasks to aid learning.

Therefore, this study aims to explore how prospective teachers reason and evaluate formative assessments to choose and use in their instruction to aid learning. The participants of this study were 11 senior year high school preservice science teachers who were taking their secondary science methods course and engaging in field teaching during data collection process. The three data sources for this study were lesson plans, interviews and students' reflection journals. All conducted data qualitatively analyzed to explore participants' reasoning in selecting and using specific formative assessments. The results showed that prospective teachers constructed their reasoning based on: (a) the purposes to use assessments, (b) the quality of assessments and (c) their experience with assessments. The findings are also supported by other studies (e.g., Tomanek et al., 2008). However, prospective teachers did not consider students and curriculum to build their reasoning to choose a specific assessment while it is crucial to support all students' learning by focusing on individual differences and curriculum requirements.

Keywords: Science education, Formative assessment, Teacher reasoning

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PROSPECTIVE MATHEMATICS TEACHERS' KNOWLEDGE OF HISTORY OF MATHEMATICS AND THEIR OPINIONS ABOUT THE USE OF HISTORY OF MATHEMATICS IN MATHEMATICS EDUCATION

Fatih Taş, Muharrem Aktümen, Fahrettin Aşici

The aim of this study was to investigate the prospective mathematics teachers' knowledge of history of mathematics and their opinions about the use of history of mathematics in mathematics education. And investigate whether there is a meaningful relationship between prospective teachers' knowledge of history of mathematics and their opinions about the history of mathematics differentiate depending on gender and each universities. Descriptive survey method was used in the study. Pre-service mathematics teachers who were studied in last years of Mathematics Education undergraduate program from Bartin University and Gazi University participated the study. Data sources included a survey instrument to determine the respondents' views about the content and Knowledge of History of Mathematics (KHM) Test developed by Alpaslan (2011).With open-ended question was aimed to determine pre-service mathematics teachers' opinions about the use of history of mathematics in mathematics education. Data will analyze with quantitative and qualitative methods and descriptive statistics were used. The results will have presented in conference.

Keywords: History of mathematics, Mathematics education

PROSPECTIVE MATHEMATICS TEACHERS' CONCEPT IMAGES OF RATIONAL NUMBER AND FRACTION

Esra Macit, Turabi Geyikli

In this study it was aimed to determine prospective mathematics teachers' concept images of rational number and fraction, in accordance with the Concept Image Theory created by Tall and Vinner in 1981. This study is a qualitative research. Study group consisted of 110 prospective primary mathematics teachers who were studying in primary school teaching program of a university in the east of Anatolia in 2014-2015 academic years. The data were collected via a questionnaire consisting of open-ended questions. In the questionnaire it was asked definitions and differences of rational number and fraction

concepts. Also it was asked that given some mathematical expression were weather rational numbers or fractional. The content analysis was used to analyze the data. The results of research showed important clues about the students' concept image of rational number and fraction. Their concept images included such as formal definition, ratio, division, irrational numbers, negative numbers, simplified version etc.

Keywords: Rational number, Fraction, Concept image, Prospective mathematics teachers

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PROSPECTIVE MATHEMATICS TEACHERS' VIEWS ABOUT THE EXAMS IN HIGHER EDUCATION

Cemalettin Yildiz

The aim of this study is to reveal the views of prospective mathematics teachers about exams they had taken during their learning periods. The study was conducted with 150 prospective mathematics teachers studying at mathematics teacher program in an education faculty of a state university. Qualitative research method was used in this study and a form comprised of open ended questions was used to gather data. Data obtained were analyzed by descriptive and content analysis techniques. At the end of the study, it was determined that prospective mathematics teachers felt themselves stressed before the exams, excited during the exams, and happy after the exams they had taken. Also, it was found that many factors originating from student, teacher, exam environment, lesson, time, and family affected the exam difficulty. The findings indicate that prospective mathematics teachers needed motivation before the exams, they did not want the exam proctors to distract their attention during the exams, and they wanted them to have an attitude which made students feel relaxed after the exams. In terms of preparedness for exams, prospective mathematics teachers prepared for the exams in their own rooms individually a week before the exams, they used mostly their course books, they were afraid of their field exams more, and they prepared less for the exams related to general knowledge. In addition, it was observed that prospective mathematics teachers wanted the kind of exams which did not exceed one hour and mostly including 25 multiple choice questions and five open ended questions. Lastly, prospective mathematics teachers wanted to have exams in a quiet environment, to be detected whether they had a preparation for cheating or not before the exams, to be free for accessory equipment sharing and to have the opportunity for checking their own examination papers after the exams.

Keywords: Prospective mathematics teachers, Exam anxiety, Triggering factors, Teacher education

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RANKING THE INTERNET USAGE PURPOSES OF INDIVIDUALS IN TURKEY WITH MULTIMOORA METHOD

Asli Çaliş, Cevriye Temel Gencer

Today, increasing communication need with developing technology appears as a factor in promoting the use of internet. The internet which was used with under speed and high cost in the 1990s, has been available for many people in recent years with high speed and lower cost due to the diversification of firms operating in the market and the increasingly competitive environment. In this study, it was aimed to rank the purposes of using the internet for internet users in Turkey between the years of 2012 and 2015 with MULTIMOORA which is one of the Multi Criteria Decision Making Methods and analysis results were interpreted.

Keywords: Multi criteria decision making, MULTIMOORA

REFLECTIONS FROM MATHEMATICS TEACHING PROCESS INTO REAL-CLASSROOM SETTING

Sedef Çelik, Ümit Kul

This study was carried out to ascertain whether and how pre-service teachers' experience gained in the "Mathematics Teaching Course" is actually reflected in the real classroom environment. The sample of the current study consisted of 10 pre-service elementary teachers who are receiving this course during their initial teacher education program. The researchers also participated in real classroom environment to closely observe how pre-service teachers teach mathematics topics and interacted with students. Data generation methods such as interviews and observational field notes were used to collect the data in comprehensive manner. Qualitative data analysis methods were employed to analyse the actual data. The findings obtained in this study were composed of two phases i.e. in the form of teachers' evaluation and researchers' evaluation. In the light of the observations of researchers, it can be said that pre-service teachers primarily faced with classroom management issue when they enter the real classroom comparing to teaching experience in the course at the university. In addition, pre-service teachers benefited from pedagogical content knowledge when students asked interesting questions on the subject-related area. The results gathered from interviews with teachers' candidates revealed that students could require more concrete mathematics teaching activities and materials. Finally, students-centred activities should be arranged in order to encourage students in real classroom environment to participate actively.

Keywords: Pre-service teachers, Mathematics teaching, Qualitative research

REFLECTIONS OF COMMUNITY OF LEARNERS' INTERACTIONS TO TEACHERS' PROFESSIONAL DEVELOPMENT

Emine Adadan, Sevil Akaygun

The basis of community of learners relies on the mutual collaborative learning among professionals and teachers to reach the common goal (Rogoff, 1994). The community of learners meets regularly for a long time to work toward a common goal, and the members of the community provide mutual feedbacks to each other following practical implimentations (Bianchini & Cavazos, 2007). In the framework of Project IRRESISTIBLE, which was funded by European Commission, a community of learners, including two science educators, one chemistry researcher, and seven science teachers, was established in the academic year of 2014-2015. This community met 35 times within 18 months to develop a module on Nanotechnology Applications in Health Sciences around the basis of inquiry-based learning, as well as integrating the aspects of Responsible Research and Innovation (RRI) into it. Meetings were held on Sundays and took 2-3 hours each time. As the community of learners worked on the module, the members discussed the concepts of nanoscience, RRI, inquiry-based learning, and how to develop an exhihit product. In this context, the purpose of the study was to examine the professional gains of teacher members of Irresistible-Turkey community of learners, based on their self-reports. The participants of this case study included the seven teachers of the community of learners (2 male; 5 female). Data collected through interviews and field notes were analyzed by utilizing the qualitative methods. Three themes emerged from the data, namely content knowledge (nanoscience and RRI, subcategories), pedagogical content knowledge, and managing the exhibit development process. In the light of data, teachers professional development was defined within three categories: (1st level) knowledge; (2nd level) self-efficacy; (3rd level) starting to be practicing. Although all teachers showed professional progression in each theme, the progressions frequently observed to be at the level of self-efficacy. Only one of the teacher members transfered his professional gains in community of learners interactions into practice in his regular science classes. This finding indicates that such community of learners' experiences should more frequently be provided to the teachers in order to assist them in transferring their gains into practice in their regular science teaching practices.

Keywords: Community of learners, Nanotechnology, Science teachers, Professional development

RELATIONSHIP BETWEEN CONCEPTUAL AND PROCEDURAL LEARNING: THE CASE OF GENERAL MATHEMATICS COURSE

İlknur Özpinar, Selahattin Arslan

In the current study, it was aimed to determine either the conceptual or procedural learning come to the forefront in the course of General Mathematics among primary school pre-service mathematics teachers and the relation between conceptual and procedural learning types. The study group consisted of 97 freshmen studying at Primary School Mathematics Teacher Training Department. Case study method was used within the scope of descriptive approach. Pre-service teachers were asked questions measuring procedural and conceptual learning within the context of general mathematics course. At the end of the study, it was found that students were more successful in the questions measuring procedural learning. Another result obtained was that while there was no positive relation towards procedural learning-> conceptual learning, there was positive relation towards conceptual knowledge-> procedural learning.

Keywords: Procedural learning, Conceptual Learning, General mathematics course, Pre-service mathematics teachers

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RELATIONSHIP OF MIDDLE SCHOOL STUDENT STEM INTEREST TO CAREER INTENT

Rhonda Christensen, Gerald Knezek

Understanding middle school students' perceptions regarding STEM dispositions, and the role attitudes play in establishing STEM career aspirations, is imperative to preparing the STEM workforce of the future. Data were gathered from more than 800 middle school students participating in a hands-on, real world application curriculum to examine the relationship of the students' interest in STEM and their intentions to pursue a career in a STEM field. Among the middle school students who completed surveys for the MSOSW project, 46.6% expressed a desire to pursue a career in STEM at the time of the post test. Regarding alignment of positive interest in STEM with intent to purse a STEM career, middle school students who have stated that they plan to pursue a career in STEM, also show higher dispositions toward STEM and STEM career measures. Gender differences were also examined, resulting in the finding that middle school males generally have greater intent to pursue a career in STEM, and also show more positive interest in STEM areas. However, females appear to more positively react to the project activities presented in this study than males, so over the course of a project year females tend to "catch up." This is true regarding assessed STEM interest as well as stated intent to pursue a career in STEM. These findings provide additional contributions to the growing base of knowledge about the importance of middle school aspirations for STEM careers.

Keywords: STEM interest, Career intent, Gender, Climate change, Middle school

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REMEDYING MISCONCEPTIONS OF 8TH GRADE STUDENTS ABOUT THE CONCEPTS OF EVAPORATION AND BOILING THROUGH CONCEPTUAL CHANGE TEXTS

Merve Özdemir, Gökhan Özdemir

The purpose of this study is to investigate the effect of conceptual change text on remedying the misconceptions of 8th grade students about the concepts of evaporation and boiling. 25 students who were studying in a public middle school located at a town in the central Anatolian participated in the study. The experimental model of the study is a pretest-posttest single group design. Before the treatment, an open ended questionnaire was administered to the students to determine their misconceptions about the concepts of evaporation and boiling. In the treatment, prepared conceptual change texts developed by the researchers were used in a 5E learning cycle to remove students' misconceptions. After the treatment, the same open ended questionnaire was administered to the students as post assessment. The results of the study indicated that most of the misconceptions of the students about the concept of evaporation and boiling disappeared. Implications for classroom practices were discussed.

Keywords: Misconception, Conceptual change text, Evaporation, Boiling

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RESEARCH OF THE EFFECTS OF SCIENCE EDUCATION BASED ON PREDICT - OBSERVE - EXPLAIN STRATEGY ON STUDENTS' SCIENCE PROCESS SKILLS AND SUCCESS

Elif Kara, Mehtap Yildirim

In this study, it is aimed to research the effect of a lecturing of "Visit and Learn the Creatures World" based on POE technique on 5th grade middle school students' academic success and science process skills. Focus group of this research consists of 52 students studying in 5/A and 5/B classes of a state school located in Büyükçekmece district of Istanbul City during the 2014-2015 academic year. The study has two groups, control group and experiment group, consisting of 26 people each. Experimental design of the research, since the students forming the study groups are not randomly assigned to the experiment and control groups, it's pretest-posttest quasi-experimental design with control group. Experimental work of the research is 4 weeks long covering a 7-week-long period. In experiment group, activities on "Visit and Learn the Creatures World" topic of science lectures are done according to POE strategy while in control group, lecturing is done according to the teaching method of the lecture present in the program. Data collection tools used in this research are academic success test and science process skills test. Data analysis of the studies are done by using SPSS.18 statistics program while independent t-test is utilised for analysis of intergroup tests and dependent t-test is utilised for analysis of intragroup tests. By looking at the analysis results of the research, a significant difference on behalf of experiment group is seen for the effect of a lecturing of "Visit and Learn the Creatures World" based on POE technique on 5th grade middle school students' academic success and science process skills.

Keywords: POE strategy, Science education, Science process skills

REVIEW OF THE ANALYSES ON THE PUBLICATIONS REGARDING THE NATURE OF SCIENCE IN EDUCATION

Nisa Yenikalayci

The objective of this study is to determine the methods and statistical analyzes used in the articles published regarding the nature of science in education. To that end, The Web of Science (Thomson Reuters) database was used. The reason for choosing the Web Science database was that, it enabled access to the strong citation scan and inter-disciplinary content. A search on the heading base was made by writing "nature of science" in English on the basic search section in the Web of Science database. The scope was limited by grounding on the works published between 2005 and 2016. 14 records were found as a result of the search, and 8 were easily accessed. The articles accesses were reviewed in terms of the methods and analyzes used. In these articles it was observed that; instead of the heavy tables that contained SPSS analyzes, basic-level descriptive statistical data such as frequency and percentage, were used. It might be stated that the subject area of the nature of science is more prone to the case studies. During data collection, open-ended questions and semi-structured interview questions were preferred. It is quite difficult to carry out the validity and reliability analyzes of the qualitative data. From this point forth, the importance of case studies for this subject area, was emphasized. By means of this study, it was analyzed and summarized how and on which groups the case study was applied. In consequence, it might be possible to review the analyzed of the studies carried out on different areas. If this study is to be compared to the quantitative studies, it might be possible to investigate why the parametric or non-parametric statistics were used.

Keywords: Science education, Nature of science, Case study

RIASEC-BASED CONTENT ANALYSIS OF PRESERVICE SCIENCE TEACHERS' INDIVIDUAL INTEREST IN SCIENCE-RELATED ACTIVITIES THEY DEVELOPED FOR TEACHING PRACTICES

Ümit Duruk, Abuzer Akgün, Fuat Tokur

Interest as a multidimensional variable comprises of closely associated two aspects as situational interest and individual interest. Individual interest, on the other hand, has some features in general belong to personal characteristics of individuals. Individuals often bring their characteristics into school settings and their interest on science learning influences their attitudes toward science. Science teachers who are more interested in science are expected to show more informed views on science learning and participate in the science-related discussions actively. A promising interplay between the science teachers joined in a variety of small groups' science-related discussions come about in science classes and the diversity of science-related activities embedded in the science content requires having students or teachers developed a richer understanding of group dynamics. However, preservice science teachers, in particular, lacks severally on constructing more informed learning environments during they carry out given or selected science tasks and struggle to engage productively in the process. The purpose of the present study was to investigate preservice science teachers' individual interest on the process of developing and selecting science-related activities for their compulsory teaching performance in the Course of Science Teaching. In the implementation process, preservice science teachers were asked to work in groups and develop science activities to meet the learning outcomes of the science teaching program put into practiced by MoNE in 2013. All groups were given one week to complete their preperation. This study presents an in-depth analysis of preservice science teachers' views on science-related activities embedded in the science context. Accordingly, the study was conducted through the content analysis method. The method of the study was operated with respect to a differentiated analytical framework put forward by Holland (1997) so as to categorize the science-related activities under the aspects of Realistic, Investigative, Artistic, Social,

Enterprising and Conventional, respectively. Developed science activities were exposed to content analysis comprehensively and the findings collected by this way were supported by the views of preservice science teachers reached by recorded videos and focus group discussions. Data were given in frequencies and percentages under certain themes already stated in the beginning and then interpreted qualitatively with the help of the data coming from the videos and focus group discussions. The results indicated that preservice science teachers' interest in developing science activities increased over time as they bring together and work on the tasks cooperatively. Most of them stated that they get more engaged in the activities and it made them more cautious when they integrate their developed or selected science activities into their learning model they run in the process. Related conclusions were also given after the investigation of science-related activities by preservice science teachers by themselves.

Keywords: Interest, Science-related activities, Content analysis, Preservice science teachers

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ROLE OF EXCURSIONS AND EVENTS ON ECO-FRIENDLY BEHAVIOR FORMATION AND EFFECTS ON STUDENT INFORMATION AND ATTITUDES

Sinan Erten

The environmental problem is global rather than local. Environmental issues affect everyone without looking to ethnicity, language, gender or other discriminations. Especially, during last years it threats the globe by "Global warming" that reported in the 5th report of IPCC. Environmental issues threat human beings existence and they make the world a hard place to live. Besides technological developments individual responsibilities are also important to overcome these issues. That might be possible with environmental education. The purpose of environmental education is to prepare responsible individuals that are environmentally friend. People can overcome environmental problems by being aware of the problems and by being responsible individuals for environmental issues. This study has been taken into consideration with those ideas. The aim of the current research is search for the effect of environmental activities and trips during the environmental course and to check if attitudes toward environment have changed or not.

Keywords: Environmental firendly behaviour, Environmental consciousness, Environmental education

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SCIENCE STUDENT TEACHERS' CONCEPTIONS ABOUT CHROMOSOMES: A DRAWING ANALYSIS

Osman Çardak, Musa Dikmenli

Biology, by nature, involves many abstract concepts at microscopic and submicroscopic levels. Abstract concepts such as chromosome are difficult to be learned by the students. Many studies have shown that students have misconceptions about the concepts which are qualified as abstract such as DNA and chromosome. Such misconceptions should be primarily determined so that they can be minimized or eliminated. There are many methods used in the determination of the misconceptions. Drawing technique is one of these misconceptions. Drawings provide a clearer area for the students for answering any questions when compared to the other techniques. Drawings both set forth the understandings of the students in a better way when compared to the other techniques and allow the researchers to see this. No research has been found about the chromosome drawings of the science student teachers in the literature

scans performed. The purpose of this research is to examine the understandings of the science student teachers about chromosome by means of the drawing technique. The study group of the research consists of 118 science student teachers who are studying at a state university in Konya province in the Spring semester of 2014-2015. The participants were given a blank A4 paper and they were asked to draw a chromosome in line with the purpose of the study. Also, interviews were made with 14 student teachers. Content analysis was made on the drawings of the student teachers and categories were formed. As a result of the analysis of the drawings and the interview, it was found that the science student teachers had partial understanding. In addition, some misconceptions were encountered about the chromosomes. Some of these misconceptions were as follows: "Sister chromatids are homologue chromosomes", "chromosomes always have two chromatids". The results were discussed with literature and it was seen that the drawing technique which was promoted by interview was effective in revealing the student understandings.

Keywords: Chromosomes, Misconceptions, Drawing, Science education

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SCIENCE, TECHNOLOGY, ENGINEERING, ART AND MATHEMATICS IN TURKEY

Elif Açil, Selçuk Arik

The aim of this study was to identify articles that have been published in peer-reviewed journals in Social Science Citation Index (SSCI) at the field of Science, Technology, Engineering, Art and Mathematics disciplines in educational sciences in Turkey and to put forward their relationships with each of these articles. To reveal the relationship among the articles of fields was important for portrayal of Science, Technology, Engineering, Art and Mathematics (STEAM) program, which is nowadays getting momentum in our country. The sample of study was articles, which have been published between 2005-2010 years in Education and Science Journal, Hacettepe University Faculty of Education Journal, Theory and Practice Journal of Educational Sciences, Eurasia Journal of Mathematics Science and Technology Education. In the study, document analysis was used in qualitative research methods. Findings and conclusions of the study will be presented later since the study is continuing.

Keywords: Science, Technology, Engineering, Art, Mathematics, STEAM programme, Descriptive analysis

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SCIENTIFIC COLLABORATION NETWORK OF ACADEMICIANS IN METU

Ilker Türker, Fatih Gökçe, Serhat Orkun Tan

Scientific collaboration networks (SCNs) are web-like structures generated by collaborating patterns between scientists. Every co-authoring activity corresponds to a link between authors in such a network. Being successful prototypes of evolving complex networks, SCNs display the generic properties of self-organizing structures including social networks, in an aspect mirroring the scientific activities of the authors also. Collecting the scientific collaboration data of Middle East Technical University (METU) from Web of Science, we constructed a SCN spanning the years 1980 to 2015. Performing the network analysis procedures, we calculated the network parameters like average separation, average degree, degree distribution, average clustering coefficient etc. We outlined that the SCN of METU shows small-world and scale-free properties, also having high clustering between scientists.

Keywords: Complex networks, Scale free networks, Scientific collaboration, Bibliography

SEVENTH GRADE STUDENTS' THOUGHTS ABOUT THE HYDROELECTRIC PLANT TRIP

Ümmü Gülsüm Durukan, Fethiye Karsli

Learning occurs not only in the formal learning environment, but also in the informal learning environment that is outside the school/classroom. In recent years, informal learning activities have been organized using learning environments such as museums, zoos, botanical gardens, and planetariums. Within the scope of these activities, learning can be performed with trips being drawn up within a plan and taking into account students' interests and desires outside the school boundaries. Considering this context, this study is intended to reflect the information and the impressions gained from the hydroelectric power plant (HEPP) trip designed for seventh grade students in a TUBITAK project. In accordance with the nature of the study process, this study has been designed using qualitative research methods with the purpose of capturing and making sense of the "lived experience" with their perspectives. 30 students participated in the study. Data were collected using the form Know-Want-Learn (KWL). On the eve of the trip, experiments and explanations related to transformers were discussed and the HEPP was mentioned. Before the trip, the "What do I know?" - "What I want to know?" sections and after the trip "What have I learned?" sections in the KWL form were completed by the students. The data were analyzed descriptively and examples of students' expressions were presented. The findings showed that the students mostly know about electric energy generation from water/potential energy, want to know how to work the HEPP and learnt the generation process of electricity. It was noted that the students who thought that HEPP damages the environment before the trip changed their opinions after the trip. With the informal learning activities, the students received information not only on the subject in one context but also in the context of different disciplines. Therefore, as an important element for students to gain knowledge, field trips must be part of the learning environment.

Keywords: Hydroelectric power plant, Seventh grade student, Informal learning environment, Field trip

SIMPLE AND EFFICIENT BI-COLOR PATH FOLLOWING ROBOT CONTROL ALGORITHM TEACHING IN ELECTRICAL ENGINERING EDUCATION

Mehtap Köse Ulukök, Burak Özyurtcu, Cem Gül, Özcan Demirel

In this study, bi-color path following robot control algorithm teaching is presented. Mostly, autonomous robots follow a path on black colored surfaces having white line or vice versa. Courses having different line colors are rarely used because of its difficulty in its implementation. Several algorithms or hardware designs are developed for the autonomous solution of path following robot problem. Two electrical engineering students are taught about robot control algorithm development through research and investigation method. A novel algorithm is developed after the education. In this paper, efficient and simple path following robot control algorithm development is studied over two colored lines on same course simultaneously.

Keywords: teaching methods, robot design, robot control, line following robot

SIMULATION MODELS IN PROCESS OF DESIGNER'S EDUCATION

Oksana Zakharkevich, Svetlana Kuleshova, Galina Shvets

The clothing industry is quickly becoming a high-tech industry due to rapid advances in technology which contribute to high quality design, cutting, stitching and finishing techniques. Furthermore, designer today has to improve professional capability according to industry's requirements. The word 'designer' is a broad description covering many different functions. A designer in a large company may specialize in a particular area and be part of a team, whilst in a very small company a designer may have to perform all the above tasks. In both cases it could be handled by using computer aided design systems at the each stage of the design process. Most of the stages are already presented by specific pattern design systems: and design process in them could be provided in two-dimensional or in three-dimensional space. Student is future professional and his capability has to be considered accordingly to the future state of the science and technology. That is why, pattern design systems and virtual three-dimensional models of the garments must be used as designer's instrument in educational process and they must be presented in all studied courses as common as it possible, though some stages of apparel design are not formalized yet. However, visual aids and handout material are common useful facilities in professional education, and even if manufacturing does not use such simulation models they might be useful for the students. Our work devoted to review of different virtual models of garments and their particular parts, as well as simulation models of the design process in sewing industry. Those models were developed by authors and recommended to use as visual aids in educational process.

Keywords: Simulation models, Virtual model, Three-dimensional design, Running simulation

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SIR CUMFERENCE SERIES (A MATH ADVENTURE): TURKISH MATHEMATICS EDUCATION PROGRAMS' COMPATIBILITY OF TALES BOOKS

Mihriban Hacisalihoğlu Karadeniz

The purpose of this research, Cindy Neuschwander's "Sir Cumference Series (A Math Adventure)" fairy tales book called the elementary school reveal the situation is no place for achievements in mathematics curriculum. In this study, because it allows examining the scope of the research aims to evaluate the suitability of fairy tales books and teaching material document analysis method was used. As a data source in the study implemented in Turkey Education Programs' and have benefited from Neuschwander tales book. Within the framework of the fairy tales book "Sir Cumference Series" has been used fairy tales books. Tales developed by the researchers in the study of the book 'Tales book in the mathematics curriculum outcomes data collection form' is used. Offering by addressing the compatibility with the tale of the curriculum according to the findings of this research, especially that focus on concepts in fairy tales, so is determined to focus on more conceptual dimension of the operational aspect highlighted in the curriculum. Therefore, the primary school teachers' in math class when the species is advisable to include time-based events.

Keywords: Mathematics education, A math adventure

SIXTH GRADE STUDENTS VIEWS ON COMPUTER ASSISTED MATHEMATICS EDUCATION

Gökhan Ucar, Ayten Pinar Bal, Muzaffer Sencer Özsezer

The aim of this study is to reveal the views of 6. grade students about the computer asisted mathamethic teaching. Among the qualitative research methods case study patterns and easy. Access situation sampling method were used in this study. In order to increase the reliability of data semi structured interviews with students who are studing in Aşçıbekirli Primary School and observations were carried out. Data were proccessed by content analysis. According to the findings it is concluded that computer asisted mathematical teaching controbutes the students academical success positively. Computer asisted mathematical teaching is very effective in teaching English to learner. However; some promlems are still existing especially resulting from computer laboratuar and students personal insufficient knowledge about computer. The application of this computer based learning aproach requires some new strict technological structures.

Keywords: Computer based mathematic, Primary school, Mathematic

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SOCIAL STUDIES TEACHER CANDIDATES' TECHNOLOGY SELF-EFFICACY BELIEFS AND THEIR ATTITUDES TOWARDS TECHNOLOGY ASSISTED TEACHING

Ozkan Akman

Efficient teacher has been perceived as a teacher who had pedagogy and field knowledge until recently. But, together with the introduction of technology into our lives in an inconceivable way, importance of technology in education has increased and technology has been included in pedagogy and field knowledge of teachers and it has become technology, pedagogy and field knowledge. For this purpose, it was tried to determine social studies teacher candidates' technology self-efficacy beliefs and their attitudes towards technology assisted teaching. As data collection tools, "Scale for Attitude of Teachers towards Computer Assisted Teaching" and "Scale for Efficiency About Educational Technology Standards" developed by Çoklar (2008), were used in this study. Study was conducted together with 166 social studies teacher candidates (86 females-80 males). This study was conducted by survey method which is one of the quantitative research methods. SPSS 18.0 software package was used in the analysis of the study. Arithmetic means, frequency and percentages were determined, t-test, one-way analysis of variance and Mann-Whitney U test were used for the analysis. According to the findings obtained in the study, it was found that teachers had high levels of computer self-efficacy beliefs and they had positive attitudes towards computer assisted teaching. Also, it was revealed that teacher candidates primarily used computer during their education, instructors used technology in their lessons and they found themselves competent in the use of technology.

Keywords: Social studies, Technology education, Attitude scale.

SPIRAL DESIGN OF "MICROSCOPE-USE" IN TURKISH SCIENCE CURRICULUM

Ramazan Çeken

Light and lens are two important terms for deeply understanding of microscope. As it mainly depends on reflection and refraction, pupils need to engage such scientific terms prior to the microscope practices. Therefore, this study investigates the contents related to the microscope in accordance with spiral curriculum. For an overall looking to microscope content in TSC, the official documents published by the Ministry of National Education were analysed at part of microscope-use and light and lens. The contents which were listed in a comparison way used to examine whether there is a parallelism between such related terms or not. It is obvious that the TSC includes microscope at K level. At 4 grade, students make simple observations using this tool. Each part of microscope are mainly introduced to the children at 6 grade. However it is clear that light and lens are needed contents to understand the microscope at 4 grade, lens is located in TSC four years later. Light is located in TSC in accordance with the spiral curriculum design. For further learning of such activities, it is absolutely required to be aware of the fact that light and lens are important basics for microscope. The result of this study also points out that there is a similar location between TSC and the previous science curriculum in terms of spiral design of microscope use.

Keywords: Science curriculum, Microscope, Spiral curriculum design, Light, Lens.

STEM ACTIVITIES IN EARLY CHILDHOOD EDUCATION: THE CONCEPT OF FORCE

Adem Taşdemir, Hasan Dilek, Serdal Baltaci, Ahmet Sami Konca

STEM education is a design of curriculum that covers four different discipline (science, technology, engineering, and math) within a multidisciplinary approach. This process contains combination of the four disciplines within real life problems, rather than education of each discipline separately. In the last decade, it is seen that students have the tendency towards social sciences rather than sciences according to the results of OSYS. This situation necessitates the design and implementation of STEM education. According to Hebb (1971), enriched environment supports problem solving skills of individuals. This study was designed to investigate answer of "What are the feasibility and possible effects of STEM activities in early childhood education?" Therefore, the study aimed to: (1) develop STEM activities for preschool children, (2) determine the barriers, and (3) determine children's perceptions. Four different activities relating the concept of the force were conducted in an early childhood classroom. The activities consist of daily life problems related solid, liquid, and air. The study is qualitative and has features of case study. During the study, each STEM activity was thought as a case and feasibility of the activities was explored. Participants were 14 preschool children aged 5 and 6. During activities, children were active in a collaborative environment. Observation notes, children's thoughts acquired from conversations, and their reactions were collected as data. The data was analyzed by frequency analysis method that is a form of content analysis. To the results, at most, children had positive perceptions for the activity of designing and establishing a bridge in the context of the force and solid. The activity of designing an airplane was the second. There were many barriers during the activities of liquid. In the activities, children tried to solve the problems by their perceptions rather than by rationale thinking. This may be reason of the barriers. Besides, children were keen on attending the activities. Furthermore, incorporation of play and STEM activities were important for preschool children. Implementations were made for further investigation.

Keywords: STEM education, Preschool children, The concept of force.

STEM CAREER INTEREST OF LOW SOCIOECONOMIC STUDENTS

Sündüs Yerdelen, Nurcan Kahraman, Yasemin Taş

One of the underrepresented groups in STEM fields is socioeconomically disadvantaged individuals (Shaw & Barbuti, 2010). For example, Leslie, McClure, and Oaxaca (1998) suggest that parents' education and income level are significant predictors of students' college selection, especially for technical fields. The Royal Society (2008) indicated that the majority of people who study science, specifically physical science, at universities are those who come from high socioeconomic status (SES) groups. Actually, students' socioeconomic backgrounds' effects have been seen in early ages. International studies like TIMSS suggest that home background is a significant predictor of both science and math achievement (Gustafsson, Hansen, & Rosén, 2011). STEM education for low socio economic groups is important since it would expand individuals' not only economic opportunities, but also social opportunities (MacPhee, Farro, & Canetto, 2013). Moreover, pre-high school experiences are important for students' career choice in the future (Sadler, Sonnert, Hazari, & Tai, 2012). Therefore, the present study aims to investigate low socioeconomic middle school students' STEM career interest (in areas of physical science, life science, technology, engineering, and mathematics) in relation to demographic variables of gender and grade level, and attitudes towards STEM areas. The sample of the study consisted of 263 sixth, seventh, and eighth grade students attending one of five middle schools located in the rural areas of a city in the northeast region of Turkey. Results showed that students had positive feelings in having a STEM career and these perceptions did not differ in terms of gender and grade level. Moreover, students' STEM career interest was high for both males and females. Among three grade levels, there was no significant difference in terms of STEM career interest, except for life science. Additionally, canonical correlation analysis showed that students' career interest in STEM was positively related to students' attitudes towards STEM fields.

Keywords: STEM education, Socioeconomic status, Middle school, STEM career interest, STEM attitude

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STEM PEDAGOGICAL APPROACH FOR PRIMARY SCIENCE TEACHERS' THROUGH EARLY ENGINEERING TRAINING PROGRAM

Rose Amnah Abd Rauf

Strengthening STEM initiatives outlined in the Malaysian Blueprint 2013-20125 aims to ensure students are equipped with the necessary skills to meet the challenges of an increasingly industrialized world. Therefore, it is necessary for teachers to be equipped with knowledge and teaching approach for STEM education starting from primary school teachers. This is to ensure that the mindset towards STEM fields can be cultivated and sown from early schooling level. Teachers of primary and secondary schools in Malaysia is still new in STEM education to understand let alone to apply the STEM pedagogical approach in schools. Based on the conceptual framework STEM Malaysia, primary science education is responsible for ensuring that students are able to make connections and build a foundation in science. Thus, the responsibility of a primary teacher is to ensure interest in science is applied and maintained using STEM pedagogical approach so that students are more incline to investigate and explore matters related to science. Thus, this paper will share experiences of how the teacher early engineering training program was implemented and the impact obtained by the teacher in preparation for implementing STEM education in primary schools.

Keywords: Stem pedagogical approach, Primary science teachers, Early engineering

STEMLESS EDUCATION

Mustafa Şahin Bülbül

This study criticize STEM approach with weak and strong sides owing to literature from the beginning to these days. Moreover to the presentation of STEM, this study offers an alternative science education approach called "Stemless Education" which lets flexible combinations of multiple disciplines. There are different approaches in science education but STEM emphasize combining four different discipline, science technology, engineering and mathematics, for science concepts; however, all concepts in science education are not appropriate to use these four disciplines together. Teachers may need to use different disciplines like Art and/or Medicine. Stemless education emphasize unlimited education which let the learner decide what to learn and focus on. Additionally stemless education support the learners with special needs.

Keywords: Stem, Science, Education, Approaches

STRUCTURAL MODEL OF BELIEFS, CONCEPTUAL KNOWLEDGE AND EXPERIENCE AMONG TRAINEE MATHEMATICS TEACHERS

Mazlini Adnan, Effandi Zakaria, Mohd Hairy Ibrahim

Beliefs, conceptual knowledge and experience play important roles in enhancing the quality and effectiveness of the teaching and learning of mathematics. As such, this study is conducted with the aim of profiling three main constructs, namely beliefs, conceptual knowledge and experience among trainee mathematics teachers. The study is also intended to produce a measurement model of these constructs and subsequently a structural model that incorporates all the hidden and observed variables. 317 trainee teachers from six Higher Education Institutions (HEIs) (public universities) were randomly selected to participate in this study. Beliefs, conceptual knowledge and experience are measured using mathematical beliefs questionnaire (MBQ), mathematical experience questionnaire (MEQ) and a test of conceptual knowledge (TCK), focusing on the topic of fractions. The structural model shows that there is a weak correlation between mathematical beliefs and mathematical experience; a very weak correlation between conceptual knowledge and mathematical beliefs; and a very weak correlation between conceptual knowledge and mathematical experience. In addition, SEM analysis shows that there is a significant contribution of the four variables on the mathematics beliefs of the trainee teachers. Furthermore, regression coefficient of mathematics content knowledge experience of the respondents is the highest among regression coefficients of the predictor variables.

Keywords: Beliefs, Conceptual knowledge, Experience, Trainee mathemtaitcs teachers

STUDENT PERCEPTIONS IN A FLIPPED OPERATING SYSTEMS COURSE

Osman Gazi Yildirim, Tolga Erdoğan, Harun Çiğdem

In technical majors like computer, in laboratories of which students could only have access to hardware and software, using time effectively is of the essence. For students to gain experience, it is important that they have experiments in courses like Network Systems and Server Operating Systems. With the development of internet and Learning Management Systems, more and more instructors have started to flip their courses by using technologies like videos, online homework, social networks, and forums. In a flipped class, students have the responsibilities of their learning. Lessons are presented online, instructors guide the in-class applications and interact more with their students. Having the aim of learning students\' opinions on flipped classes, this study was implemented in a four-hour Network Systems Laboratory with the participation of 25 students, who took the Operating Systems Course in a vocational college during first semester of 2015-2016 Academic Year. Instructors loaded the maximum 10-minute videos, course materials and projects on the system. Under the guidance of their instructors students did the weekly projects in class. Three application tests, the averages of which were 54.20, 89.16, and 86.8 respectively, were given to students through the semester. Students were interviewed right after the first and third test applications. After the first test, students reported that the visuals were good, but they preferred the lessons to be delivered by the instructors; after the third test students stated that they did more applications during classes and in laboratory hours of other courses this method also could be utilized to provide more space for applications. The results of this study showed that flipped classes could be effectively used in courses where students don\'t have much time for applications outside laboratory hours, however students need to be informed of the method and the expectations right at the beginning.

Keywords: Flipped classroom, Student perception, Blended learning

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STUDENT TEACHERS' LACK OF PROFICIENCY IN DIFFERENTIATING BETWEEN OBSERVATION AND INFERENCE

Mustafa Cansiz, Nurcan Cansiz

Elementary student teachers are the key to the students' early science education. As teachers, they should have an adequate understanding of nature of science. Nature of science is considered as an essential element of scientific literacy in national and international science education reform movements. In this vein, we aimed to investigate one of the components of nature of science which is the difference between observation and inference. Observation and inference are also among the basic science process skills. Preservice elementary teachers, as the first actors in introducing science to the elementary students, need to understand the difference between observation and inference so that they can provide opportunities to their students to practice these skills in their classrooms proficiently. In this study, 34 preservice elementary teachers were shown different images and asked to write their observations and inferences. Analysis of their responses showed that they cannot differentiate observation from inference. They held inadequate views in terms of the difference between observation and inference. The results of this study implies that primary elementary teachers are not well qualified for differentiating two of basic science process skills and nature of science components. The results were discussed in terms of science education and elementary teacher education.

Keywords: Observation, Inference, Student teachers, Nature of science

STUDENT VIEWS WITH REGARD TO THE WEB-BASED PROBLEM SOLVING METHOD

Barış Emlek, Ahmet Oğuz Aktürk

The purpose of this study is to determine the views of 2nd year students at a university who received the Programming Course designed in accordance with the Web-based Problem Solving Method about the said method (WBPSM). The views of 11 students selected from among the 29 students who had taken the course on a voluntary basis were elicited concerning WBPSM. In this study, in which the qualitative research method was used, the semi-structured interview technique was used as the data collection instrument. The interview form, which consisted of 12 open-ended questions, was administered to the 11 students, who had taken the course. As a result of the analysis of the data obtained from the students, it was seen that the students had stated that WBPSM supported individual learning, raised interest in the course, ensured non-spatial learning, increased their self-confidence in learning on their own, gained them problem solving ability, enabled them to assume responsibility in learning, encouraged them investigate, saved time and that it was applicable for other courses, too.

Keywords: Web-based learning, Problem solving, Qualitative research.

STUDENT-CURATED EXHIBITS ON NANOTECHNOLOGY APPLICATIONS IN HEALTH SCIENCES

Sevil Akaygun, Emine Adadan

Student-curated exhibits have been recently used in science education (D'Acquisto 2006). Planning, designing, and presenting exhibits as a part of their science education bring several advantages to students, because they will be transforming science from product to process (Hawkey, 2001) as they are actively involved in this process. According to Sleeper and Sterling (2004), encouraging students to do research on their own interests under the guidance of a teacher develops skills of formulating questions, collaboration, and observation. Within the IRRESISTIBLE project (www.irresistible-project.eu), a module called Nanotechnology Applications in Health Sciences was developed and implemented to a group of students ranging from Grade 5 to 12, as an extracurricular activity. After the students completed the 8 lessons of the module, they worked on building an interactive science exhibit on Nanotechnology Applications integrating Responsible Research and Innovation (RRI). A total of 55 students, 45% female and 55% male, from 7 different schools participated in the study by completing the module and preparing an interactive exhibit either indivually or in a group of 2-3. At the preparation stage of the exhibit items, students got feedback from their teachers and the researchers. The exhibit items were analyzed according to their type and the content. The types of exhibit items that were observed in the exhibit included interactive games, digital applications, concrete models, posters and display models. The analysis of the content of the exhibit items revealed 4 categories; items including only nanotechnology, items including only RRI, items including nanotechnology and RRI from a topic included in the module, items including nanotechnology and RRI from a topic not included in the module. At the end of the exhibit, students were interviewed and observed that students developed better understanding of nanotechnology and RRI, and improved skills of collaboration and construction.

Keywords: Student-curated exhibits, Nanoetchnology education, Responsible research and innovation, Interactive exhibit

STUDENTS SELF-EFFICACY AND ACHIEVEMENT GOALS AS PREDICTORS OF THEIR METACOGNITIVE SELF-REGULATION

Savaş Pamuk, Ridvan Elmas, Yakup Saban

The purpose of the study is to determine the predictive power of students' self-efficacy and achievement goal orientations on their metacognitive self-regulation. Literature stated that self-regulated students trust their abilities to achieve a task successfully, set effective goals to their learning, and use metacognitive strategies effectively (Pintrich, 2000). Metacognitive self-regulation can be considered as a key aspect of self-regulation. Students who are metacognitively active plan, monitor, and evaluate their learning process and change the strategies. They tend to have better understandings of science topics. As a key construct of motivational component of self-regulation, self-efficacy means judging people make about their capabilities to organize and perform actions to reach designated levels of attainment (Bandura, 1997). Accordingly, higher self-efficacy beliefs enable students to attempt difficult tasks, to have persistence in face of the difficulties, and to construct different strategies to learn meaningfully. Moreover, students' achievement goals, another key construct of self-regulation, to learn and to be successful guide their behavior in achievement settings (Ames, 1992). In this study, it was proposed that students who are self-efficacious, mastery-oriented or performance oriented will have high metacognitive self-regulation skills. The survey data were gathered from 903 seventh grade students by conducting two instruments, self-efficacy and metacognition, of Motivated Strategies for Learning Questionnaire (MSLQ) and Achievement Goals Scale. Data were analyzed by conducting Multiple Regression Analysis. The results showed that students' self-efficacy and mastery goal orientations were significant predictors of metacognitive self-regulation. Accordingly, students who are highly self-efficacious and mastery-oriented will have high metacognitive self-regulation skills. Also, metacognition was predicted by mastery avoidance and performance avoidance goals, but not predicted by performance approach goals. These implied that students who to believe in their abilities to do given tasks successfully, set mastery avoidance and performance avoidance goals generally for themselves, use metacognitive strategies effectively in science classes.

Keywords: Self-efficacy, Achievement goals, Metacognitive self-regulation

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STUDENTS' OPINIONS ON COMPUTER-AIDED CONCEPTUAL CHANGE APPLICATIONS

Güliz Aydin

The objective of this study is to define the students' opinions on the computer-aided conceptual change strategy applications in the unit of "The Granular Structure of the Matter" in Science Course. The applications were conducted with 21 students for 5 weeks (20 lessons period of time) allocated in the curriculum for the unit in a secondary school in Muğla city center. The subjects of "The Granular Structure of the Matter" unit comprises of various abstract and complicated concepts, which are difficult for the students to concretise and structure. Therefore, students were encouraged to make use of computer-aided conceptual change activities such as; concept cartoons, concept maps, mind maps, conceptual change texts, models and analogies during the unit. The researcher prepared and developed the 14 computer-aided conceptual change activities, which are free from any misconceptions, after taking experts' opinions and conducting the pre-applications. During the applications, students were encouraged to do group-work (4 groups of 4 students each, and a group of 5 students). Following the applications, 5 students, one from each group, were given semi-structured interviews in order to define their opinions regarding the activities conducted. The qualitative analyses of the interviews with the students were completed and samples of their statements were presented. It is observed that students expressed positive opinions on the activities developed and conducted.

Keywords: Computer-aided learning, Conceptual change, Students' opinions

TEACHERS' VIEWS ON MEASUREMENT AND EVALUATION OF THE SCIENCE AND TECHNOLOGY COURSE

Cemile Manav Kaşikçi, Dursun Yağiz

The study was conducted in order to examine the opinions of the teachers of the science and technology education course regarding the measurement and evaluation. The study was carried out by 30 science and technology teachers from 24 primary schools in Viranşehir and Ceylanpınar, Şanlıurfa during the 2008-2009 academic year. An interview form was used to determine the views of the teachers on the assessment. Descriptive analysis of the data was conducted. Some of the conclusions drawn from the analysis are:
1. Teachers stated that assessment completes the teaching process.
2. Teachers mostly prefer written exams, project tasks and portfolios but they do not use other alternative assessment methods.
3. Measurement and evaluation techniques were chosen according to their appropriateness to students' levels and the activities that can be done with materials at hand.
4. Teachers graduate with the theoretical knowledge from universities but they experience problems in practice in teaching, and therefore the necessity of in-service training related to the practice are highlighted in the study

TEACHERS' BELIEFS, KNOWLEDGE, AND CLASSROOM PRACTICE: THE EFFECTIVENESS OF PROFESSIONAL DEVELOPMENT FOCUSED ON ARGUMENT-BASED INQUIRY APPROACH

Yejun Bae

This study was designed to examine the relationship between features of professional development and self-reported change in teachers' beliefs, knowledge, and classroom practice. Professional development (PD) is a place for communication with teachers and researchers, learning collaborations, and self-development. 28 middle school teachers' PD participation to implement the Science Writing Heuristic (SWH) as an argument-based inquiry approach that is strongly correlated with student gains in science learning and critical thinking has been conducted. This baseline phase addresses the research questions that examine the relationship between teacher changes in their belief and knowledge of argument based inquiry and their growth in implementation level, and the relationship between critical features of PD and teacher changes in beliefs and practice. This research found that PD improves the quality of implementation which is directly linked to the impact of SWH approach on student performance. Positive teacher change in the effective professional development is very important as it is a critical and productive place for teacher development. In addition, teacher participation in PDs plays a significant role in development of argument-based inquiry strategies as a means of improving students' conceptual understanding of science and critical thinking skills. This research ensure the improvement learning environment through teacher improvement in their understanding of argumentation, beliefs about learning, and practices with SWH approaches.

TEACHERS' IDEAS ABOUT THE BENEFITS AND CHALLENGES OF TEACHING CLIMATE CHANGE THROUGH EVIDENCE-BASED THINKING

Gaye Defne Ceyhan, Ebru Z. Mugaloglu

Analytical thinking and decision-making are among the objectives of the National Science curriculum in Turkey as well as Next Generation Science Standards. These skills are crucial in evidence-based thinking and critical evaluation processes, those of which have an important place in understanding the nature of science and content knowledge. In order to investigate science teachers' and science educators' ideas about teaching socio-scientific issues through argumentation, a three-hour workshop was conducted. 125 science teachers, who are working in public schools of an urban area in Turkey participated in the workshop and completed the feedback form. Two researchers analysed the answers in the feedback form and the field notes from the workshop. The data was categorised in 1) benefits, 2) challenges and difficulties, 3) appropriateness to the science curriculum, 4) propriety to the grade, 5) design of the diagram. Based on this framework, science teachers' ideas of using MEL diagram in the classroom will be presented in detail. 90% of the participants approved that MEL diagram is appropriate for science teaching. This study contributes to the literature on teaching socio-scientific issues, especially through argumentation, evidence-based thinking and critical evaluation. Moreover, the investigation of the science teachers' ideas of teaching socio-scientific issues by using MEL diagram contributes to science teacher education literature.

Keywords: Evidence based thinking, Climate change, Socio-scientific issues

TEACHING CONCEPTS AND USE OF HIGH-ORDER COGNITIVE STRATEGIES IN MATHEMATICS AMONG SECONDARY SCHOOL TEACHERS

Effandi Zakaria, Norhidayah Addenan, Siti Mistima Maat

This study was conducted to identify the level of emphasis of teaching mathematics on the understanding of concept and high-order cognitive strategies. A total of 15 teachers from four schools in Pasir Gudang, Johor were selected as respondents. Selected teachers were teachers who teach Mathematics for Form Two. The instrument used in this study was a checklist with a 5-point Likert scale and an interview protocol. This checklist has two parts, Part A on the background of the respondents and Part B on the observation of respondents while teaching which contained 21 items. Data obtained from observation were analyzed using descriptive statistics such as mean, frequency and percentage. The findings from the interview were also analyzed to help researchers make an explanation. The findings showed that the mean of teacher emphasis on understanding the concept and meaning in teaching mathematics was moderate (m = 2.98). The teacher emphasis on the use of high-order cognitive strategies in the teaching of mathematics was also moderate (m = 2.79). These findings have implications for mathematics teachers to always have a more effective teaching strategies and can help to improve higher-order thinking skills in students.

Keywords: Teaching concept, Cognitive strategies, Mathematics teacher, Understanding of concepts

TEACHING FRACTIONAL ORDER CONTROL SYSTEMS USING INTERACTIVE TOOLS

Nusret Tan, Ali Yuce, Furkan Nur Deniz

Much of subjects being taught in a first course on control theory in Electrical and Electronics Engineering appears to have changed little. Although the basic theories, methods an applications on classical control in textbooks remain unchanged, there have been many new developments in the field of control theory in recent years. One of such topic is fractional order control systems which is based on fractional order calculus and can be used to model physical system more exactly than integer order systems. The purpose of this paper is to show how fractional order control methods can be introduced into a first course on classical control using interactive tools such as Matlab and LabVIEW.

Keywords: Control theory, Matlab, Labview, Fractional order systems, Electrical and electronics engineering

TEACHING METHODS OF SCIENCE TEACHERS ACCORDING TO STUDENTS' VIEWS

Asli Kaygin, Gökhan Özdemir

The purpose of this study is to determine teaching methods employed by the science teachers in their instructions and students' views about these methods in practice. Data was gathered from 5th grade 75 students who study in a middle school located at south east part of the Turkey. A likert type instrument was used to assess students' views evaluated via a descriptive analyses method. The results of the study indicate that science teachers most frequently use verbal lecture, demonstration in class, whole class discussion, and question-answer teaching methods in their instructions. Students most frequently want to be used verbal lecture, doing experiment in laboratory, demonstration in class, observation on events in nature, and out-of- class or out-of-school trips as methods of teaching. Implications for classroom practices were discussed.

Keywords: Science teaching, Teaching methods, Science education

TEACHING PARTICLE PHYSICS TO A BLIND LEARNER

Mustafa Şahin Bülbül

This study focus on Feynman Diagrams and Standard Model with tactile materials for a blind learner. There is a brief introduction about history of understanding the structure of atom with all in one 3D material. This study includes the interaction of a blind learner with the material which is designed for teaching basics of particle physics. Not only blind learners, by the help of haptic materials all learners can benefit. In most classical curriculum, there are more emphasize to oldest concepts or principles however talking about modern physics may engage learners to science like the current scientists. With this study we aimed not only to demonstrate that tactile materials help blind learners and teachers for current and intangible

concepts but also to demonstrate that a teacher can teach the most difficult structures with basic tactile models.

TEACHING STRATEGIES MEDIATED BY TECHNOLOGIES IN THE EDULAB MODEL: THE CASE OF THE SUBJECTS OF MATHEMATICS AND NATURAL SCIENCES

Ana Oliveira, Lúcia Pombo

EduLab model is a new educational model that integrates technologies in educational contexts comprising full equipped classrooms with attractive and easy-to-use technological resources. This model tries to promote a dynamic and more effective teaching and learning process, boosting the digital inclusion of everyone involved. For this purpose, the model provides teachers training and monitoring in order to encourage innovative pedagogical and acting formats, such as collaborative learning, flipped classroom and research-based learning (Pombo, Carlos, & Loureiro, 2015). In the "EduLabs", every classroom is equipped with computer, projector and interactive board. Aditionally, both students and teachers have tablets, digital schoolbooks and educational resources, as well as a classroom management software. The current article intends to characterize and analyse the developed teaching strategies with the use of the available technologies, carried out in the subjects of Mathematics and Natural Sciences of a fifth grade class in the Gafanha da Nazaré School Grouping (Aveiro, Portugal). With this purpose, classes observations from the considered subjects took place, where observation grids were filled in, as well as the researcher book note. In addition, data were also collected through the survey technique (by interview) to the teacher of the class. In the Natural Sciences subject, technologies were used, particularly, to support the resolution of work proposals. The research-based learning and collaborative work were implemented as a way to develop skills and "acquiring" knowledge by the students. In some Natural Sciences classes, flipped classroom method was implemented with significant gains for students' learning. In the Mathematics, technologies were used, specially, to support the resolution of work proposals and oral exposition by teacher. There also was a diversification of strategies; however, attending to the specificity of the subject, the curriculum extension and the need to prepare students for external evaluation, the implementation of innovative strategies was less frequent.

Keywords: EduLab model, Technologies, Teaching strategie, Innovation, Mathematics and science education

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TEACHING STYLES USED BY PROSPECTIVE TEACHERS IN SOLVING PROBLEMS

Yasemin Deringöl

It is highy important to know how individuals think, how they develop their thinking skills and thinking types in terms of learning success. Based on it, there are situations in which every individual's thinking tendencies are different. These situations are also thinking types which students perform while they are solving a problem. Two of them are analytical and holistic thinking styles. While individuals with dominant analytical thinking style prefer solving a problem by dividing it into small parts, individuals with dominant holistic thinking style prefer solving a problem by considering it as a whole. Accordingly, the purpose of this study is to identify thinking tendencies which are dominant in solving a problem with regard to condidate

Maths teachers and classroom teachers to be teachers in the near future. The sample of the research is composed of totally 347 teacher candidates, 147 of whom receive education in Maths teaching and 200 of whom receive education in Classroom Teaching in a state university in İstanbul in academic year 2015-2016. The research is in scanning category and descriptive method is used. As a means of collecting data in line with the main purpose, "Personal Information Form" developed by the researcher and " Holistic and Analytical Thinking Scale in Problem-Solving" developed by Umay and Kızıltuğ(2007) are used. There are totally five items in the scale. The items in the scale are useful in identifying to which one students are more close to, analytical thinking or holistic thinking the items of the scale give place to problem-solving expressions that can be considered as analytical and holistic thinking used in problem-solving. In line with the sub-problems of the research, analysis will be made and results will be debated in line with the related literature and recommendations for he body of literature will be presented.

Keywords: Pre-service teachers, Problem solving, Holistic and analytical thinking styles

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TEACHING THROUGH THE BLENDED MODE OF LEARNING: BENEFITS, ISSUES AND CHALLENGES

Fatima Dar

The concepts of online and blended learning have gained considerable importance in academia and programmes are developed where educational concepts are presented by utilizing the said modes. The idea of blended learning revolves around an education programme in which information is shared through an intermix of online media and face-to-face interaction with the instructor. The blended mode of teaching and learning makes students autonomous learners as they face the challenges to adjust between online and face to face interaction. The interaction also engages them in critical inquiry as they investigate learning materials presented through an unconventional mode. Blended mode of learning is well suited for university students where the possibility of experiencing self-directed learning runs supreme. The paper, therefore, discusses the results of the efficacy of the blended mode of learning as experienced by undergraduate students at a private university. In addition, the paper also highlights the issues and challenges that impede the successful implementation of blended learning programmes in higher education. Moreover, the paper also gives recommendations for the smooth integration of the blended mode of learning for various education programmes at the university level.

Keywords: Digital learning, Online media, Educational technology

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TECHNOLOGY INTEGRATED CLASSROOMS FOR KINDERGARTEN ENGLISH LANGUAGE LEARNERS

Rahime Filiz Kiremit

This study identifies six different articles to explain which strategies are most effective for kindergarten English Language Learners. The literature review project has information about six different research articles, purpose of the studies, and results of the studies. There are some different strategies for teachers to use to teach English to new language learners. Every child has different learning style and characteristic. Therefore, teachers should keep in mind while interacting with children. The teachers should create opportunity for all kinds of children in the classroom. Also, classroom environment can be very effective for children's language development, so the teacher needs to create more opportunity for children to

develop their language skills and lets them learn. Classroom activities should encourage children's learning. Everybody learns differently, but some strategies might be useful for all the students. The teacher should plan some activities and use some strategies in the classroom, so the children can have opportunities to learn more. And also, the teacher can manage the classroom with maximum student learning time. I think this research topic will be useful for teachers to apply the most effective strategies into their classroom activities to increase students' learning. There are several strategies can be used for ELL students to help them to develop their English language skills. Some articles mention technology as a multimedia integrated into the curriculum, some of them mention writing as a method of learning English as a second language. However, they all have a common strategy that is shared reading. According to these six articles, shared reading has a big role of ELL students' language developmental process. All in all, read-aloud with multimedia enhancement strategy is the best strategy to use in the classroom, because this strategy is based on shared reading and also integrated with technology. Therefore, the children can see the words, hear the words, and identify how to write the words.

Keywords: Effective strategies, English language learners, Multimedia enhancement strategy, Shared reading, Technology

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THE ADAPTATION OF THE NATURE OF TECHNOLOGY SCALE TO TURKISH

Aziz Teke, Ali Murat Sünbül, Özlem Sadi

The purpose of the present study was to adapt the instrument for assessing students' concepts of the nature of technology scale developed by Pey-Yan Liou to Turkish language in order to assess its reliability and validity, and to analyse the gender and school differences. The scale consists of 29 items and six sub-dimensions named technology as artifacts, technology as an innovative change, the current role of technology in society, technology as a double-edged sword, history of technology, and technology as a science-based form. Data in this study were collected from a total number of 360 students studying at four different high schools. Validity and reliability studies were carried out. As part of validity studies expert opinion was collected, linguistic equivalence and confirmatory factor analysis were used. As part of reliability studies Cronbach Alpha's coefficient of internal consistency was calculated. In accordance with the analyses carried out in this study, the scale was adapted to Turkish language as a valid and reliable scale.

Keywords: Nature of technology, Scale development, Reliability, Validity

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THE COMPARISON OF SCHOOL ADMINISTRATORS' AND ICT TEACHERS' TECHNOLOGY LEADERSHIP PROFICIENCIES

Fatih Süleyman Biçer, Mustafa Koç

Technology leader is a person who ensures the coordination required for effective and productive technology use in an organization and who motivates and mages the organization in that direction. Strong technology leadership in the schools considerably impacts technology integration in learning and teaching. For this reason, it is necessary that school managers as technology leaders take responsibility for effective implementation of information and communication technology (ICT) and they develop required competencies to fulfill such responsibility. The primary purpose of this study is to determine and compare

technology leadership profiles of school principals, vice principals and ICT teachers in Isparta, Turkey. Therefore, the study is unique in terms of bringing out the differences between schools managers' and ICT teachers' technology leaderships. Moreover, it aims to explore the relationships between technology leadership and demographic characteristics including gender, age, experience, and so on. The study was designed as a correlational survey research as it investigates the relationships among various variables. The research population was made up of school managers and ICT teachers working in secondary education and high schools in the city center. Employing convenience sampling, the researchers recruited a total of 282 informants from75 schools (250 male and 32 female) including 71 school principals, 108 vice principals, and 103 ICT teachers. Data were collected through a two-part questionnaire. The first part included demographic questions and the second part included technology leadership scale. The scale items were devoted to technology standards for administrators (NETS-A) developed by International Society for Technology in Education (ISTE) in 2009 and they clustered under five factors: visionary leadership, digital age learning culture, perfection in professional practice, systemic improvement and digital citizenship. Data were analyzed trough both descriptive and inferential statistics and the results were discussed in terms of theoretical practical implications for the contexts of technology integration, school administration, and professional development.

Keywords: Technology leadership, School managers, ICT teachers, Comparison

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THE DESIGN OF A SECURE QUIZ EXTENSION FOR MOODBILE

Mustafa Kaiiali, Armagan Ozkaya, Halis Altun, Marc Alier

E-learning has been adopted broadly by various institutions all over the world. However, the expansion of mobile devices creates a new form of E-learning, called m-learning. M-learning encompasses all learning delivered via mobile devices. It helps to make the learning process learner-centered by promoting "Bring Your Own Device" (BYOD) model of learning technology. Despite its increasing demand among students, m-learning lacks teachers and/or institutions confidence who are accustomed to use e-learning systems such as LMSs. Moodbile project was the first attempt to find a moderate solution between the two parties by the integration of m-learning initiatives with LMSs. On the other hand, M-learning has unique security requirements especially for conducting exams. For that, we have designed a Secure Exam Management System (SEMS) as a service extension to Moodbile. SEMS enables mobile exams to be conducted securely (as cheat free as possible). This paper discusses the design principles of SEMS. It also conducts a survey about students/teachers acceptance and confidence to adopt such exam systems.

Keywords: Learning Management System (LMS), M-learning, E-learning, Exam engine, Access control

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THE DETERMINATION OF THE THINKS OF PRE-SCHOOL TEACHERS' TOWARDS SCIENCE PROCESS SKILLS AND LEVELS OF USING THE BASIC SCIENCE PROCESS SKILLS

Mustafa Uğraş, Erol Çil

The aim of this study is to determine the views of preschool teachers on scientific process skills and basic scientific process skills they included in science activities. Study group included 32 preschool teachers determined with purposive sampling method. A semi-structured interview form developed by researchers to determine the views of preschool teachers on scientific process skills, and to determine basic scientific

process skills they included in science activities, a science activity syllabus detailing the application process were used as data collection tools in the present study. Collected data were analyzed with content analysis method. Conducted analyses demonstrated that participating preschool teachers did not possess adequate theoretical knowledge on scientific process skills and were not completely proficient in basic scientific process skills. Teachers stated that science literate individuals would be trained as a result of development of scientific process skills. They reported that the predominantly utilized observation as the basic scientific process skill in science activities they conducted. Analysis of the application process identified that in observation, students were in the position of observation only.

Keywords: Pre-school science education, Basic scientific process skills, Science activities.

THE DEVELOPMENT AND VALIDATION OF A MALAYSIAN-BASED BASIC SCIENCE PROCESS SKILLS TEST

Ong Eng Tek, Norjuhana Mesman, Sabri Mohd Salleh, Siti Eshah Mokshein, Nik Azmah Nik Yusuff, Mdm Yeam Koon Peng

This paper reports the development and validation of a test that measures the basic science process skills for upper primary school pupils as stipulated in the Malaysian science curricula. In the instrument development phase, 58 Basic Science Process Skills (BSPS) items were generated according to a set of a priori indicators. These items were vetted by two reviewers to ensure content validity and to establish inter-rater agreement, yielding a Cohen's Kappa value of 0.877, p = < .001. The BSPS Test was then field tested with a group of 197 upper primary students (aged 10-12) that represents top, average, and bottom sets. The dataset was subjected to item analyses, resulting in a quality 29-item BSPS Test. The BSPS Test has a KR-20 reliability of 0.86, and means for difficulty and discrimination indices of items that measured at 0.61 and 0.49 respectively. This paper ends with a discussion as to how the quality 29-item BSPS Test could be used in the classroom alongside the mandatory science practical assessment, thus providing the concurrent validity.

Keywords: Basic science process skills, Primary science, Development, Validation, Malaysia

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THE DEVELOPMENT OF PRE-SERVICE SCIENCE TEACHERS' REFLEXIVE PRACTICE AT THE LEBANESE UNIVERSITY FACULTY OF EDUCATION

Hanadi Chatila, Iman Abou Ali

A major aim in teacher's preparation program is to promote reflective practice among future teachers. Literature in teacher education points out to the importance of reflection in the development of quality teaching (Coffey 2014; Jay & Johnson, 2002; Perrenoud 2012). Schon's (1987), propose a conceptual framework about reflective practice that involves three phases of reflection: reflection-on-action which refer to the reflection after doing the action reflection-in-action which occurs during the doing, and reflection for action, that takes place before the doing of the action as the teacher reflects about the future experience informed by the past practice. The current study, aims to explore if the training program at the Lebanese University, Faculty of education, prepare reflective primary science teachers, on the basis of Schon's (1987) framework. For this purpose a convenience sample of 30 participants from third year primary science pre-service teachers was selected to participate in the study. Both quantitative and

qualitative method including questionnaire, interviews and classroom observation were used in the study. The results show that pre-service teachers develop mainly "reflection-for-action" and "reflection-in-action", however they lack strategies for the "reflection on- action" as they face difficulties in self-assessment and regulation.

Keywords: Reflective practice, Pre-service science teacher, Professional development.

THE DEVELOPMENT OF STUDENTS' MATHEMATICAL SKILLS IN THE EVALUATION OF NUMERICAL EXPRESSIONS INVOLVING ORDER OF OPERATIONS

Ernna Sukinnah Ali Rahman, Masitah Shahrill, Nor'arifahwati Abbas, Abby Tan

This small-scale action research study examines the students' ability in using their mathematical skills when performing order of operations in numerical expressions. In this study, the 'hierarchy-of-operators triangle by Ameis (2011)' was introduced as an alternative BODMAS approach to help students in gaining a better understanding behind the concept of the order of operations. The study of 21 Year 9 students in one of the government secondary schools in Brunei Darussalam used mixed qualitative and quantitative methods, where data was collected from the students' pre and post-test scores. Comparisons of the scores showed positive progress and greater improvement in the students' performance. Interviews from the students were also analysed to gain insight of the feedback of the new approach. Most of the interviewed students interviewed responded that it is easier for them to remember the triangle rather than using the mnemonic as a tool to remember the order of operations.

Keywords: Order of operations, Numerical expressions, Secondary mathematics

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THE EFFECT OF ADIDACTICAL SITUATIONS ON STUDENT TEACHERS' LEARNING OF ELECTRIC CURRENT TYPES

Ümmü Gülsüm Durukan, Ayşegül Sağlam-arslan

The studies based on the theory of didactic situations (TDS), one of the theoretical frameworks of didactic, show that the students could reveal and learn the targeted knowledge by reducing teachers' intervention to the minimum. There are three different didactic situations in TDS. In adidactical situations the responsibility mostly lies with the students and the teacher's role is limited. Students learn as a result of interaction with the milieu. There are five stages in adidactic situations; devolution, action, communication, validation and institutionalization. The aim of the study was to determine the impact on students' learning of the subjects by developing learning environments in adidactical situations for electric current types. This study was carried out by the didactical engineering method. Didactical engineering is a research method that allows restructuring and overcoming the deficiencies of teaching practices on the basis of a designed learning environment. The sample of the study comprises 17 sophomores studying elementary mathematics teacher education, taking the General Physics II class and participating in all of the application processes. In the context of adidactical situations, three types of learning environments are designed for the electric current, including direct current, induction current and alternative current. The teaching sequence in adidactical situations lasted three weeks. The achievement test was used in order to demonstrate the effects of adidactical situations on learning. Analysis of the data obtained was performed using understanding levels. The findings obtained from the analysis of understanding levels indicate that

the student teachers' knowledge of the subject progressed from lower understanding levels towards upper understanding levels. In the teaching sequence of adidactical situations, some alternative concepts like 'alternative current can be produced by rheostat' were developed by student teachers. In the light of the research method, these alternative concepts were tested during the sequence. The answers to the achievement test's last application are located in the upper understanding levels. This finding reveals that the teaching sequence and designed adidactical situations are effective. In addition, while the questions about electric current types can be answered scientifically, the relationship between the types of electric current cannot be established.

Keywords: Didactical engineering, Adidactical situations, Types of electric current

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THE EFFECT OF ANIMATION ASSISTED ACTIVITIES ABOUT 'STRUCTURE AND PROPERTIES OF MATTER' ON STUDENTS' MOTIVATION AND ATTITUDES TOWARDS SCIENCE

Şeyma Ulukök Yildirim, Kadriye Bayram, Ebru Aydin, Mustafa Metin

One of the main purposes of science teaching is to raise qualified people that are desired in today's world and in order to be qualified; these people should have scientific literacy. Moreover, people having scientific literacy are expected to have motivation and positive attitude towards learning science. Until today, a lot of international and national researches have been made on students' motivation and attitudes towards science. These researches show us that students' motivation and positive attitudes towards science are hierarchically become lower from their primary years to high school years. It is also stated that content of the course, teachers, students, course materials, intensive curriculum and inappropriate use of teaching methods and techniques are all cause for this decrease. Considering the results of the studies, it can be said that as choosing appropriate methods and techniques and also diversifying them during teaching appeal to multiple senses, they increase students' motivation and positive attitudes. One of the applicable methods used recently is computer simulations or animations that have educational potential and that are the main focus of researches on education. It is seen that when computer assisted animations are used for teaching science, students' interest in topic and their positive attitude towards the course are increased and also there is an opportunity for students to find answers for why and how they learn. When the studies on animation are reviewed, it is seen that the studies are success-based and there are limited number of studies on affective issues such as motivation and attitude. So; from this aspect, this study will make a contribution for literature. Within this context, the aim of this study is to find out effects of animation assisted activities for the 7th grade science topic "structure and properties of matter" on students' motivation and attitudes towards learning science. The study is conducted by using pretest posttest control group design that is one of the quasi experimental researches and it lasts for 7 weeks. The sample consists 7th grade students of a secondary school that is randomly chosen among the schools in a central district of Ankara province. Among 7th grades of this school, randomly 30 students are chosen for control group and another 30 students are chosen for experimental group. One of the data collection instrument of the study is "Student Motivation toward Science Learning Questionnaire" developed by Tuan, Chin & Shieh (2005) and adapted by Yılmaz & Huyugüzel Çavaş (2007) and its reliability coefficient is 0.87. The other data collection instrument is "Student Attitude toward Science Scale" developed by Geban, Ertepınar, Yılmaz, Atlan & Şahbaz (1994) and its reliability coefficient is 0.83. Moreover; for data analysis, SPSS program is used. In order to find out whether there is a significant relationship between the pretest and posttest scores of students; independent sample t test is used for analyzing relations between groups and dependent sample t test is used for analyzing relations within groups. The 0.05 level of significance is used for analysis of the results. And the results show that animation assisted activities are more effective in increasing students' motivation for learning science and their positive attitudes towards science compared to the instructions within the scope of curriculum.

Keywords: Animation assisted teaching, Science learning, Attitude, Motivation

THE EFFECT OF COMPUTER-ASSISTED INSTRUCTION IN PRESCHOOL ON ACADEMIC SUCCESS

Nilüfer Okur Akçay

The rapid development in technology in recent years can be distinctly seen in almost every stage of our lives. It is argued that the computers being used in education have brought the term educational technology along with itself and using technology in education is beneficial in many aspects. Besides computers can be used in every field in education, they can be used to train student groups at any level. Computers also contribute to the educational process in preschool education. By using computers, the children are presented rich and various learning environments, are given the opportunity to learn while having fun, computers create the opportunity for the children to repeat the subject as much as they want and reinforce what they learn, to develop new methods by stimulating their creative aspects. Thanks to computers, creativity and critical thinking skills of the children are developed, they communicate with each other and work together to reach the aim. In this study, the effectiveness of computer-assisted instruction on gaining the 6-year-old children in preschool the space concept was analyzed. The study is a quasi-experimental study with pre-test and post-test evaluation and experiment (N=18) and control (N=20) groups. Overall performance test is used pretest-post test as data collecting tool and in the light of the obtained data it was determined that the academic success of the group on which the computer-assisted instruction has been applied is higher than the group on which traditional instruction method was applied. In this direction, it can be said that the preschool teachers should be supported by giving them seminars and courses to use the computers in their classes effectively.

Keywords: Computer-assisted instruction, Preschool, Science education.

THE EFFECT OF CONCEPTUAL CHANGE TEXTS ON STUDENTS' UNDERSTANDING OF SCIENCE CONCEPTS: A META-ANALYSIS STUDY

Isil Koc, Burcu Gelen

The purpose of this research was to investigate the effect of conceptual change texts on students' understanding of science concepts. The research followed up meta-analysis research methods. The data was extracted from master's theses, doctoral dissertations and articles in peer-reviewed journals. The data was gathered from Elton B. Stephens Company (EBSCO), Education Resources Information Center (ERIC), Turkish Council of Higher Education National Thesis Center, ProQuest and ULAKBIM Social Sciences databases, Google Scholar with peer-reviewed journals and the electronic library of universities. The data was selected with regard to the main problem of the study. In this respect, a total of 52 studies were included in the meta-analysis. The overall effect size for these studies was calculated as 1,094. This is a large effect size according to Cohen's criteria. As a result, conceptual change texts were found to be more effective than traditional teaching methods. In addition, conceptual change texts enhanced by using technology support were found to be significant impact on students' understanding of science concepts.

Keywords: Meta-analysis, Conceptual change texts, Alternative conceptions, Science education

THE EFFECT OF COOPERATIVE LEARNING MODEL IN PRE-SCHOOL CHILDREN'S ACADEMIC ACHIEVEMENT ON SCIENCE

Nilüfer Okur Akçay, Seda Okumuş, Oylum Çavdar, Kemal Doymuş

The purpose of this study was to examine the effect of cooperative learning model on pre-school children's academic achievement on science education lessons and be able to get teachers' views on this method. This research was conducted with preschool that in the Ağrı city center in spring semester of the 2014-2015. The sample of the study that implementation of cooperative learning model in the experimental group was 16 children; the implementation of traditional methods in the control group was 18 children formed. As data collection tool, the test that consist of open-ended questions and observation forms which prepared by the investigator. It has focused on environmental education in research and lasted four weeks. The data were analyzed by using descriptive analyze and independent samples t-test. According to the research results, the group's of cooperative learning model is more success than the traditional method, and also as a result of the observation form the children in the cooperative group listen to their teacher and each other carefully, more active, and they are respectful communication with each other, they are sharing, develop their sense of responsibility so they contribute to their friends were identified.

Keywords: Cooperative learning, Pre-school, Science education

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THE EFFECT OF ENTERTAINING EDUCATIONAL MATERIALS ON STUDENTS SCIENCE COURSE METAPHORS

Zerrin Tok, Sema Altun Yalçin, Paşa Yalçin

Çalışma da; öğrencilerin eğlenceli eğitsel materyallerle işlenmekte olan Fen Bilgisi Dersi metaforları araştırılmıştır. Böylece öğrencilerin fen bilgisi dersi algılarının ortaya çıkarılması amaçlanmıştır. Ayrıca eğlenceli eğitsel materyallerin, öğrencilerin Fen Bilgisi Dersi algılarında bir etki oluşturup oluşturmadığını gözlemlemek amacıyla Milli Eğitim Müfredatına uygun olarak ders işlenmiş olan öğrencilerin Fen Bilgisi dersi algıları da metaforlar yardımıyla belirlenmiştir. Çalışma verileri açık uçlu sorulardan anket formları aracılığıyla toplanmıştır. Verilerin analizinde nitel araştırma yöntemlerinden betimsel analiz tekniği kullanılmıştır. 2015/2016 eğitim öğretim yılında 74 ortaöğretim öğrencisi ile gerçekleştirilmiştir. Çalışma da Fen Bilgisi Dersi öğretmen tarafından belirlenmiş olan, dersin içeriğine kazanımlarına uygun eğlenceli eğitsel materyaller kullanılarak işlenmiştir. Eğlenceli eğitsel materyaller kullanılarak ders işlenmiş olan 34 öğrenci ile Milli Eğitim Müfredatına uygun olarak ders işlenmiş olan 40 öğrencinin görüşlerine başvurulmuştur. Tüm öğrencilerden "Fen Bilgisi Dersi" kavramına yönelik metafor oluşturmaları istenmiştir. Çalışmanın sonucunda eğlenceli eğitsel materyaller kullanılarak ders işlenen öğrencilerin Fen Bilgisi Dersi metaforlarının fenin günlük yaşantıdaki yeri ve önemi ve fenin bilimlerinin işleyişi ile ilgili olduğu saptanmıştır.

Keywords: Entertaining educational materials, Science course, Metaphor

THE EFFECT OF MOBILE ASSESSMENT ON STUDENT PERFORMANCE

Mustafa Erol, Ahmet Ozcan

The aim of this study is to compare the performance of undergraduate students in mobile and paper-based examinations, and reveal their thoughts about performing mobile assessment in instructional process. Case study method has been used in the study and 25 undergraduate students comprised the study group. The research has taken five weeks, and each week students got both mobile and paper-based quizzes after a three-hour English course. The mobile and paper-based quizzes were parallel with each other, and students answered the paper-based and mobile tests respectively. After five weeks, interviews have been conducted with students. The results of the tests have been analysed by using t-test and ANOVA. The findings show that there are not significant differences between mobile and paper-based tests. The students' thoughts reveal that they prefer mobile test because of learning the results faster and enjoying while having exam.

Keywords: Mobile assessment, Paper-based assessment, Performance

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THE EFFECT OF T-STEM DESIGNATION ON CHARTER SCHOOLS: LONGITUDINAL EXAMINATION

Ayse Tugba Oner

In the early 2000s policymakers pointed out the need for establishment of STEM schools in the United States (U.S.) because of the insufficient number of students pursuing STEM degrees and people in STEM careers. Since then, the number STEM schools has been increasing in the U.S. with the aim of improving student achievement in STEM disciplines as well as other purposes. Substantial number of STEM schools in the Southern U.S. was located in Texas and their number has been growing rapidly (named as T-STEM academies) since 2006. T-STEM academies were converted from different types of schools and almost three quarters of them were previously charter schools. The funds allocated to T-STEM academies and their STEM model design were high likely some reasons why these schools chose to be T-STEM academies. After charter schools' designation to T-STEM, it was inevitable to examine the effect of T-STEM designation on charter schools. Therefore, the purpose of this study was to compare students' mathematics and science achievement in T-STEM charter and non-T-STEM charter schools longitudinally. In order to select comparable non-T-STEM charter schools, propensity score matching was used. There were 1481 participants (55.7% female, 76% Hispanic, 12.8% White, 8.3% Asian, 2.9% African American, and 68.5% L-SES) who were had at least two years of mathematics and science scores. Students' Texas Assessment Knowledge and Skills high stakes test scores were used as an instrument. To examine students' science and mathematics scores, hierarchical linear modeling was used. It was found that Asian and Hispanic (who were also L-SES) students' mathematics and female Asian and Hispanic students' science scores in T-STEM increased over time, which was not the case for non-T-STEM charter schools. In conclusion, the effect of STEM model for minority student' achievement was promising result to reveal the importance of STEM designation.

Keywords: STEM, Mathematics achievement, Science achievement, Charter schools

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THE EFFECT OF TIME ON LEARNING DIFFICULTIES (THE EXAMPLE OF PROBLEM SOLVING WITH NATURAL NUMBERS)

Deniz Kaya, Cenk Keşan

The purpose of the current study is to determine the effect of time on learning difficulties regarding the gain of 6th grade curriculum "students can solve problems that require to use four operations". The study, which has adopted scan model, was conducted with 69 girls and 71 boys, totally 140 students, at the 6th grade education level. An assessment instrument which consists of 12 open-ended questions was used as a data collection tool. The findings indicated that the learning group of 140 students fell behind in the level of mastery learning until 0.011. Girls reached the minimum level of mastery learning regarded as 0.989 with 2.55 lesson hours, boys reached that level with 2.87 lesson hours. Also learning groups reached some level regarded as 0.999 with 6.1 lesson hours, girls reached this level with 5.65 and boys reached this with 6.71 lesson hours. Moreover, as there was a decrease in the area under the curve belonging to the learning level-time graphic, there was also a decrement in the number of learning difficulties that the learning group encounter before. At the end of the study, the probability to determine nearest course hours to mastery learning level for each acquisition located in all levels of education and all the curriculums was offered as a recommendation.

Keywords: Learning difficulties, Time, Problem solving with natural numbers, Sixth grade

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THE EFFECT OF USE OF THE RUBRIC TRAINNIG IN SCIENCE EDUCATION ON TEACHER PERCEPTIONS AND APPLICATIONS REGARDING MEASUREMENT AND EVALUATION

Yildiz Korkmaz, Ahmet Afyon

This study has been prepared and conducted in order to reveal the effect of rubric use on science teaching, to find out the teachers' point of views and their practice upon rubric use in testing and evaluation, and also to guide teachers by lecturing them about the application of rubric. The research has been realized in two stages. In the first stage, an experimental research study consisting of pre-test and post-test control groups has been used in order to test the effectiveness of the lectures using rubrics. In the second stage, a survey model from descriptive research models has been implemented. Qualitative analysis method has been applied by interviewing to reveal the views of the teachers who attended the lectures and also the views of the teachers who did not attend the courses using rubrics and testing and evaluation techniques. The research is a descriptive study of the survey model. The sampling of the research consisted of 10 science and technology teachers from seven different primary schools in Seydişehir, (Konya). The survey and interview forms have been used to collect data for the aim of the research. In the stage of the data collection, after the sources about the research subject have been analyzed, a survey which consisted of two separate parts was conducted and interviews were held with ten science and technology teachers from seven different primary schools in Seydişehir to take their views about the application of rubric and other testing and evaluation techniques. The data derived from the survey have been evaluated statistically ("Mann –Whitney U" analysis). The interviews have been analyzed with a descriptive approach and qualitative analysis method has been applied. The application of the survey and the views of the science and technology teachers have revealed that they have a positive attitude towards the alternative testing and evaluation techniques. In addition, they emphasized and classified that the difficulties they experienced during the applications of alternative testing and evaluation techniques are the pressure of time, source deficiency and the crowd of the classrooms. The lecture about the application of rubric not only affected the views of the teachers positively on behalf of the use of alternative testing and evaluation techniques but also made a positive influence on the rubric use. In accordance with this, it helped to propose solutions to the difficulties they experienced during the stage of the application.

Keywords: Rubric, Science Education

THE EFFECT OF USING DRAMA ON PRE-SERVICE SCIENCE TEACHERS' UNDERSTANDING OF ASTRONOMY CONCEPTS

Behiye Akçay, Seda Usta Gezer

The aim of this study is to investigate the effect of using drama in science teaching on pre-service science teachers' understanding of the astronomy concepts. Participants were 59 junior level pre-service science teachers who were registered science lab course. Participants were asked to prepare drama based on 5th, 6th, 7th and 8th grade science textbooks content. Data sources included researcher's field notes, open-ended questions about astronomy concepts, students' reflection papers and Astronomy Self Efficacy Belief Scale. Results showed that using drama as a supporting strategy has a positive effect on pre-service science teachers' understanding of astronomy concepts as well as to develop more informed view about it.

Keywords: Astronomy, Drama, Science, Pre-service teachers

THE EFFECTS OF CONCEPT CARTOONS ON STUDENTS SCIENCE PROCESS SKILLS

Kübra Sancak, Bekir Güler

Science includes many tangible and intangible concepts. Visual materials are very important for teaching these concepts effectively. One of these materials is concept cartoons. Concept cartoons help students to express and compare scientific concepts or cases, thus associate the content of science lessons with their daily life. The aim of this study was to investigate the effects of science courses enriched with concept cartoons on students' science process skills. Participants are 46 5th level students from Bartın Gazi Secondary School in the academic year 2015-2016. Courses in experimental group conducted using concept cartoons which prepared proper to student gains while conducting without cartoons in control group. Concept cartoons were prepared by researchers considering the learning gains in Science Curriculum. Toondoo and other Web 2.0 technologies were used to design the cartoons. Data was collected using "Basic Process Skills Scale" which was developed by Padilla et al. (1985) and adapted by Aydoğdu and Karakuş (2015). It is expected that students who were trained using concept cartoons will get higher scores than the control group's score. After analysing process, the results will be featured in full text.

Keywords: Concept cartoons, Science process skills, Science education

THE EFFECTS OF INQUIRY-BASED EXPERIMENTS ON STUDENTS' PERCEPTIONS TOWARDS SCIENTISTS

Senem Karaca, Bekir Güler

Inquiry-based learning, which was included to science curriculum and have been using since 2013, is an important approach to provide training individuals who are adequate for present conditions. It provides students to learn via their real experiences and effects their ideas about the environment. The scope of this study was to investigate the effects of inquiry-based science experiments on 6 th grade students' perceptions towards scientists. The study was conducted with 48 students from Bartın TOKI Secondary School in the academic year 2015-2016. During the study, experimental group was trained using inquiry-based science experiments while the control group was being trained with demonstration experiments. The developments and changes on students' perceptions were assessed using questionnaire with open ended questions and the drawings taken from students. The themes were created using the questions asked, and a descriptive analysis was applied to the data. The findings will be given in full text after the analysing process. It is thought that results will contribute to the literature for increasing the effectiveness of science lessons.

Keywords: Inquiry-based learning, Science education, Perception towards scientist

THE EFFECTS OF TEACHING METHOD WITH SIMPLE MATERIALS ON SECONDARY SCHOOL STUDENTS' TRANSFER OF SCIENTIFIC CONCEPTS INTO THEIR DAILY LIVES

Abuzer Akgün, Ümit Duruk, Nazli Yildirim

Most of the studies carried out in the science education field figure it out students struggle to transfer scientific conceptions into daily live circumstances. Despite many conceptions learned in the school are closely associated with their daily lives, they still tend to construct the meanings regarding these conceptions in an unscientific way. For this reason, transferring process is getting affected adversely or negatively. Herewith, conceptual learning should be based both on the conceptions and the relationships between them. Certainly, it doesn't mean that tranfering is get secured by this way. However, students should involve scientific environments in which they could perform their scientific process skills as well as they could find the chance to construct their own knowledge onto their prior knowledge themselves. It requires active student participation to construct knowledge in the science courses. The students participated in the science activities get the chance of recognizing and eliminating their existing alternative conceptions. Beside, materials are also needed for motivating and encouraging students participate in the active learning classrooms. One of the materials is that of designed by hand, constructed through creativity and imagination and organized by cheaper stuff. These materials present students various thinking abilities and dispositions to facilitate their conceptions to transfer into other contents or contexts. The purpose of this study is to explore the effect of the science activities conducted by using hand-made materials on the transfer of conceptions. The study utilises the pretest-posttest control group design. The sample group comprises sixty 5th grade students from a state school in the province of Sanlıurfa. In the study, comprehension tests released by MEB were used as pre-test. The unit of "Light and Sound" in the science curriculum was taught with the activities include hand-made materials in the experiment group while include fabrication materials in the control group. The activities are expected to last five weeks. During this process, students are also asked to fill periodically in the emotion diaries to reveal their emotions. Data collection is ongoing and about to be completed soon.

Keywords: Science education, Tranfer, Simple materials

THE EFFECTS OF THE NATURE OF SCIENCE ACTIVITIES ON THE NATURE OF SCIENCE AND SCIENTIFIC EPISTEMOLOGICAL FAITHS OF PRE-SCHOOL TEACHER CANDIDATES.

Mustafa Uğraş, Erol Çil

The objective of the present study is to research the effect of nature of science instruction based on direct reflective approach on the views of pre-service preschool teachers on nature of science and their scientific epistemological beliefs. The study was conducted with 38 Fırat University, Faculty of Education Preschool Teaching Department senior students. The study was conducted with seven activities that were used in previous studies. Views of Nature of Science Questionnaire (VNOS) and Scientific Epistemological Beliefs Scale were utilized as data collection tools. Data was collected by applying the scales before and after the activities. Data collected via the Views of Nature of Science Questionnaire were digitized by assigning 3.5 points for scientifically adequate explanations, 1 point for partially adequate scientific explanations, and 0 point for non-scientific explanations and then assessed based on these scores. SPSS software package was used to analyze quantitative data and required analyses were conducted. It was determined that pre-service teachers had a poor understanding on the nature of science before the applications were conducted. Based on study results, it was determined that most of the illusions of the pre-service teachers on the nature of science were eliminated at the end of the application that entailed direct reflective approach activities. It was also found that beliefs of pre-service teachers on epistemological structure of science improved after the application.

Keywords: Science education, Pre-school science education, Epistemological belief, Nature of science, Direct reflectors.

THE EXAMINATION IN TERMS OF VARIOUS VARIABLES OF THE TEACHER CANDIDATE'S SELF-REGULATED LEARNING SKILLS

Zeliha Özsoy Güneş, Gülşah Batdal Karaduman

Self-regulated learning can be defined as one's knowing himself and all the techniques, tactics and strategies he uses to learn on his own. This means that it's the task of one's setting his own goals and motivating himself cognitively in accordance with their own principles. Self-regulation is a deep and intrinsic mechanism which holds careful, deliberate and considerate student behaviors on the basis. This study aims the examination in terms of various variables of the teacher candidate's self-regulated learning skills. Quantitative research methods were utilized for research and screening model is used. In Education Faculty, 348 teacher candidates from science and elementary school department forms the sample of the study. In the study, "Self-regulating Learning skills (SRLS) Scale", developed by Turan (2009), is used as tool of data collection. In order to analyze the data, SPSS 16.00, ANOVA, independent T-Test, Post-Hoc Tests are used. At the end of the study, for the total scores of SRLS Scale, has a difference for the females, considering the gender variable. The significant differences weren't found between the graduated secondary schools and the department with total scores of SRLS Scale.

Keywords: Learning skills, Self-regulated learning, Pre-services science teacher, Pre-services elementary school teacher.

THE EXAMINATION OF 7TH GRADE STUDENTS' ACHIEVEMENTS IN MATHEMATICAL PATTERNS

Mihriban Hacisalihoğlu Karadeniz, Cemalettin Yildiz

The aim of this study is to determine the 7th grade students' achievements in mathematical patterns presented by figures, tables, number sequences, and word problems. Case study method was used in the study. The sample of the study consisted of 47 female and 50 male students, totally 97 students from 7th grades in Giresun city on 2015-2016 academic year. An achievement test of 7 questions which was developed by the researcher was used to gather data. The questions in the test were prepared to determine understandings of students related to patterns and exampling of them related to their understandings. Achievement test focused on the attainments of pattern topic. Data were analyzed by content analysis method. It was determined that students could perform specializing in figural patterns but they couldn't reach a generalization. In other words, it was observed that students could find the required steps according to a given rule and so they could easily reach the situation which involved operational knowledge. Also, it was seen that although students found the number of figures in the next step of the pattern, they couldn't find the general rule that represented the pattern. Another result of the study was that students could recognize patterns of number sequences but they couldn't find the general term of the pattern. Lastly, it was determined that students couldn't understand patterns which were represented as word problems and they failed at these kind of pattern questions but they had success in pattern questions represented by tables. In this context, it can be offered to give much place to representation forms of patterns by figures, tables, number sequences, and word problems while students are given experiences of patterns.

Keywords: Elementary school mathematics curriculum, Numbers and operations learning domain, Algebra learning domain, Pattern representation forms, 7th grade students

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THE FUNCTION AND IMPORTANCE OF AMGEN PROJECT IN SCIENCE EDUCATION SUPPORTED BY EUROPEAN ONION

Nuray Akbulut

EU has often prepared various projects in last years to provide for each student a qualified science education . These projects which are about science education have been prepared by European Schoolnet. Amgen Teach Project is one of these projects. The purpose of this research is to provide information about Amgen Teach Project developed by EU and to specify the importance of process in learning and teaching science. This project has been realized by collaboration with European Schoolnet and Amgen organisation. The main target of this project is to contribute science teacher's professional progress in secondary school and increasing student's interest in science with "Inquiry-Based Science Education" approach. Amgen Teach Project is being carried on throughout the ten European countries after having implemented its practices for two years in four European countries. In this context, it has been organised workshops in Brussels to be benefited as possible as for more teachers. In these workshops, it has been worked out on new approaches in science education and it is carried out some events and practices toward the function and importance of technology in science education. It is explained the context of Amgen Teach Project, effective using of "Inquiry Based Science Education" approach and the function and importance of technology in science education to the teachers who come from different European countries. Through this project, teachers who belong to the different education culture can share their knowledges by sharing their experiences. At the end of this research there have been reached some propositions on science education.

Keywords: Amgen teach project, Science education, Inquiry-based science education

THE HISTORY OF ASTRONOMY IN MUSLIM CIVILISATION, FOR EDUCATING MOROCCAN FUTUR SCIENCE TEACHERS TO SCIENTIFIC THINKING IN HARMONY WITH THEIR CULTURAL IDENTITY

Abdelaziz Razouki, Salah-eddine Khzami, Boujemaa Agorram, Sabah Selmaoui, Mustaapha Arfaoui

Many reasons support the relevance of the history of science in science teaching and in science teachers training, as forexemple, providing meaningful perspective about scientific concepts, processes and context (Hsingchi A.Wang and David D. March, 2002), allowing to have an appreciation of the intelecual, technical, social and personal factors that contributed to science achievements, or showing how modern science has been upon the achievements of non-European cultures (Michael R. Matthews, 1994). We argue that in Muslim countries, like Morocco, there are in addition of those reasons others which support the introduction of the history of science in the land of Islam in teachers training. For exemple, developping scientific literacy of futur teachers, reconciling them with their cultural identity through discovering the technical and theoretical scientific achievements of Muslim civilization and allowing them to discover how rationality had been developed to resolve cultual problems. Those are the goals of a training unit entitled « The history of astronomy in muslim civilisation » that we have designed for the benefit of students of a specialized master for science teaching at the High School of Teachers Training in the Cadi Ayyad University, Marrakech, Morroco. In this communication, we describe those goals and the taught content that goes with them. We try to show how it is possible to make use of the appeal that religion has on our students to root them in scientific thinking by highlighting the way in which it had allowed the Muslims to appropriate and develop the scientific heritage of previous civilizations and, in the same time, to live their faith.

Keywords: Astronomy, History, Muslim civilisation, Science, Teacher

THE IMAGES OF SCIENTIST ON MIDDLE SCHOOL STUDENTS WHO MAKE PROJECT TO SCIENCE FAIR AND ITS EFFECTS ON THEIR LIVES

Sema Aydin Ceran, Seda Çavuş Güngören

The aim of this study is to determine the images of scientists on middle school students who make project to science fairs and its effects on their lives. The research was conducted in the spring term of 2014-2015 academic year in Ankara. It was designed as a case study in qualitative research methodology. Totally 34 students attended to the research. The 17 of them made project in TUBITAK 4006 Science Fair and the other 17 who selected randomly in school did not make make a project. Data were collected through DAST (draw a scientist test) test developed by Chambers (1983). Beside this, an open-ended questionnaire which develop by researchers used to determine students who make project to science fairs and its effects on their lives. The results were obtained comparing two groups' responds. Content analysis was used for the analysis of data. While making content analysis, it is pointed out that the original expressions were used in the determined categories. To ensure the validity and reliability, the data has been analyzed on the basis of consensus. The findings were interpreted according to calculation of the repetition frequencies of the specified code in each category. The results showed that students who made project and not made projects have same perceptions on physical properties of the scientists. However, the expression frequencies of the students who made project like "continuously drink coffee, his eyes swollen and a man working hard in its time separation" and "science cannot be an age limit for producing scientific

information regarding the age of the people," are take attention. The opinions about scientists produce scientific knowledge and share this information (broadcasting) has only expressed by the students on the project group. According to the result of the experiences in the process of preparation for the science fair showed that there was a positive effect for learning, increased their curiosity towards science, enjoyed them this experience. Beside these, the impact of the project on the career choices of students examined and the majority of the students stated that the project they contribute to their career choices.

Keywords: The images of scientist, Science fair, DAST, Science education

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THE IMPACT OF MOTIVATIONAL STRATEGIES ON MATH ACHIEVEMENT: TESTING THE MEDIATING ROLE OF SOURCES OF MATH SELF-EFFICACY WITH STRUCTURAL EQUATION MODELLING

Eyüp Yurt

Motivational strategies used by students in math course have a significant effect on their math achievement. Sense of self-efficacy is one of these motivational strategies. Mastery experiences, vicarious experiences, verbal persuasion and physiological states are the four sources which form sense of self-efficacy. In this research, the mediating role of sources of self-efficacy in the effect of motivational strategies on math achievement was examined. The data were collected from 226 seventh grade students. Motivating strategies scale (Karadeniz, Büyüköztürk, Akgün, Çakmak, and Demirel, 2008), sources of math self-efficacy scale (Yurt and Sünbül, 2014), and a personal information form were used for data collection. Correlation, regression and structural equation modelling were used in the analysis of the data. The findings demonstrated that there was a significant relationship between learning strategies and math achievement, and that sources of self-efficacy had a mediating role in this relationship.

Keywords: Motivational strategies, Math achievement, Sources of self-efficacy

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THE IMPACT OF PRE-PRIMARY SCHOOLING ON FUTURE MATHEMATICAL ACHIEVEMENT FROM AN INTERNATIONAL PERSPECTIVE: A QUANTITATIVE ANALYSIS BASED ON PISA DATA

Yipeng Tang, Weiyi Wang, Yongmei Hu

Pre-primary education can improve the cognitive achievement of children in the future, which has been evidenced by a growing body of studies. With data from PISA 2012, this paper provides new detailed evidence and in-depth discussion. Our study found, pre-primary education participation rate is positively linked with the added value of students' mathematics scores, and resistance ratio, implying the possible impact of pre-primary schooling on both education quality and equality. More specifically, the each 1 percentage increase in participation rate can lead to an increase in mathematical score by 1.4 percent, and an increase in the resistance ratio by 4 percentage, which convinces that pre-primary schooling can not only improve the human capital of future citizens, but also education equality. Furthermore, we select several typical countries with distinguished pre-primary education model, and show that in whatever kind of educational institutions, pre-primary schooling can help to reduce the side effect of some family and social factors, such as single parent, immigration.

Keywords: Mathematics, Pre-primary education, PISA

THE IMPACT OF ROTATING CLASS SYSTEM ON THE SUCCESS LEVELS AND ATTITUDES OF THE STUDENTS IN THE LIGHT UNIT

Yunus Pinarkaya, Cengiz Özyürek

The purpose of this study is to examine whether 7th grade "light topic" taught in rotating class has an impact on students' attitudes towards science and technology. This study, which was designed as an experimental design in the form of pre-test post-test control group, was carried out with 46 7th grade students in the 60th Year Secondary School in Altınordu district of Ordu province in the second semester of 2014-2015 academic year. The sample group of the study was chosen via convenience sampling and the experimental and control groups were randomly selected among the sample. The classes of the experimental group of the study (n=23) were taught in rotating classrooms whilst the classes of students in the control group (n=23) were taught in classical classroom for 4 class hours in a week for 4 weeks as stated in the annual plan. The quantitative data in the study were collected via achievement test prepared by Çil and the Attitude Scale towards Science and Technology developed by Aydın. The data collection tools were administered as a pre-test before the experimental process and a post-test after the experimental process. The collected quantitative data in the study were analyzed using SPSS 16.0 package programme. And since the data in the study showed a normal distribution, parametric tests were used. The courses carried out in the rotating classrooms were photographed and were used in appropriate places in the study. The results of the analyses revealed that the success levels and attitudes of the students who were taught in rotating classrooms were higher. In this sense, it is believed that wider use of rotating classroom system will have positive effects on success levels.

Keywords: Rotating class system, Science education, Light

THE IMPACT ON INFORMAL LEARNING ENVIRONMENT ABOUT 5TH GRADE STUDENTS ACADEMIC ACHIEVEMENT OF LEARNING FOSSILS

Hakan Türkmen, Didem Büyükaltay

In this study, the effect of the Museum of Natural History, one of the Informal Learning Environment, on 5th grade students academic achievement about learning of Fossils" subject via using learning cycle approach was examined. Post-test control group research design was used in the study. Study population is all secondary schools in Turgutlu district of Manisa province and the sample group, "İhsan Erturgut Secondary School," was selected by cluster sampling method from among 20 secondary schools in Turgutlu district. The experiment and control groups of the research were constituted from two branches based on the results of science written exam and in-class performance and there are 60 persons in total of which 30 are in experiment and 30 are in control group. In the study, the subject of "fossils" was taught to the experiment group by using learning cycle approach at Natural History Museum in Ege University. In the meanwhile, the students of control group were not applied any special learning methods, they were taught as old same as. In this research, Science achievement test consisting of 10 multiple-choice items which were developed to measure students' academic knowledge level by the researcher was used. Independent samples t-test was used as a post-test for the analysis of data obtained as a result of achievement test. As a result, there is a significant difference was found between experiment and control groups and the difference is in favor of the experimental groups. Shortly, it can be concluded that there is a positive effect of the Museum of Natural History on 5th grade students academic achievement about learning of Fossils" subject via using learning cycle approach.

Keywords: Informal learning environment, Museums, Science teaching, Learning cycle approach.

THE IMPACTS OF ANXIETY AND SELF-EFFICACY BELIEFS OF STUDENTS ON THE ACHIEVEMENT LEVELS ABOUT READING AND INTERPRETATION OF GRAPHS

Erdoğan Halat, Firdevs Çimenci Ateş

The aim of this study was to examine the effects of anxiety and self-efficacy beliefs of the eight grade students on the achievement levels about the reading and interpretation of the frequency polygon (line graph) and histogram. There were a total of 388 eight grade students involved in this study. They attended to the study from four different middle schools. The researchers used three different instruments in the collection of the data. One of the instruments was a multiple choice statistics test that included 22 questions about the reading and interpretation of graphs and finding of the measures of both central tendency and dispersion. This test was developed by the researchers who piloted it and found its reliability of Cronbach's alpha value as 0.80. The researchers also used a math anxiety scale developed by Şentürk (2010) and a math self-efficacy beliefs scale developed by Umay (2002) in the study. After the collection of the data, the researchers employed the paired samples t-test, independent samples t-test and two-way ANOVA in the analysis of the data. The study demonstrated that the anxiety and self-efficacy levels of the eight grade students in mathematics had considerable effects on the students' achievement levels about the reading and interpretation of the frequency polygon (line graph) and histogram. The study also indicated that there a positive relationship between the students' self-efficacy level and the overall test scores. Furthermore, when their achievement levels were examined according to their anxiety levels, the achievement levels of the students on the test were found successively high, low and medium. The interaction of students' anxiety and self-efficacy levels did not influence the accomplishment levels of the students about the reading and interpretation of the graphs.

Keywords: Statistics, Graphs, Anxiety, Self-efficacy beliefs, Math

THE IMPORTANCE OF SYMBOLS AND UNITS IN NATURAL SCIENCE

Tolga Gok

The science and engineering students are expected to know the basic quantities and to distinguish the derived quantities regardless of their majors. The symbols and units are important to understand, interpret, and correlate in natural science. The purpose of this study was to investigate the importance given to the symbols and units by students. The research was conducted with 220 students. Data were collected using an evaluation form designated for examining the students' knowledge about the some symbols and units. The students were asked twelve quantities. The descriptive statistical analyses of the research data were performed. The results of the research indicate that the students ignored the symbols and units. Detailed results and recommendations based on the findings of the research were presented in the research.

Keywords: Higher education, Natural science, Symbol, Unit

THE INFLUENCE OF GENDER, TEOG EXAM SCORES AND SOCIO-ECONOMIC STATUS ON THE ACCOMPLISHMENT OF STUDENTS REGARDING READING AND INTERPRETATION OF THE FREQUENCY POLYGON AND HISTOGRAM

Erdoğan Halat, Firdevs Çimenci Ateş

The aim of this current study was to investigate the effects of variables, such as gender, TEOG exam scores and socio-economic status on the 8th grade students about the reading and interpretation of the frequency polygon (line graph) and histogram. The study included three hundreds eighty-eight 8th grade students who were from four different middle schools. The researchers used a multiple choice statistics test in the collection of the data. This test contained twenty-two questions about the reading and interpretation of graphs and finding of the measures of both central tendency and dispersion. This test was developed by the researchers who piloted it and found its reliability of Cronbach's alpha value as 0.80. In the analysis of the data, the researchers used the paired samples t-test, independent samples t-test and two- way ANOVA. The study pointed out that the participants of this study were more successful in reading and interpretation of frequency polygon (line graph) than histogram. There were no statistically significant differences found in the computation of mode, median, range and standard deviations in both types of graphs between the achievement levels of the students. In other words, types of graphs did not influence the achievement levels of the students regarding the computation of measures of both central tendency and dispersion. However, the study also indicated that the participants were more successful on the items that required the interpretations of standard deviations than the items which required the calculation of standard deviations. Moreover, although gender was not a great factor on the accomplishment levels of the participants on the test, both TEOG exam scores and socio-economic status played prominent roles on the students' achievements on the test. There was a positive relationship between the students' achievement levels and socio-economic status on the statistics test.

Keywords: Gender, Socio-economic status, TEOG exam scores, Graphs

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THE INFLUENCE OF TOULMIN'S ARGUMENT PATTERN ON SEVENTH GRADE STUDENTS' AWARENESS OF DEMARCATION PROBLEM

Behiye Akçay, Merve Arik

The aim of this study is to improve seventh grade students' understanding on demarcation of science from pseudoscience using Toulmin's argument pattern. Participants were 24 seventh grade students from a middle school in Istanbul. They were voluntarily attending the "Science Applications" course during 2014-2015 academic year. The study took place during second semester of academic year and continues for five-week. Cosmic science, reflexology, astrology, numerology and bioscience topics were used during the science instruction. Qualitative data collected from students' interviews, video recordings, students' reflection papers, and students' term papers. Results of data showed that using argumentation instruction help seventh grade students to develop more scientific understanding of how to demarcate science from pseudoscience.

Keywords: Argumentation, Demarcation, Seventh grade, Toulmin

THE INVESTIGATION OF 6TH GRADE STUDENTS' PROBLEM POSING PROCESSES ON ANGLES

Tuğba Şengül Akdemir, Elif Türnüklü

The aim of this study is to investigate the problem posing processes of 6th grade students on angles. The participants of this study are 40 students (21 males, 19 females) that chosen from a middle school in İzmir. 5 problem posing questions has with regard to topic of angles that prepared by taking of expert opinion was applied to the participants. The problem posing questions were arranged by considering three categories these are free, semi-structured and structured problem-posing types (Stoyanova, 2005). In this context, the problem posing questions which are related to angles was divided into three categories, free problem posing, the posing of angle problem presented with visual data and algebraic data in this study. After collecting the students' written answers, clinical interviews were conducted with students in order to analyze problem posing process in more detail. When analyzing the data, it is founded out that the concept of angle that envisioned, the knowledge that learned and the problems that solved in advance by the students influenced problem posing process. In addition to this, it is revealed that some misconceptions that arised from problem posing process and influenced the process.

THE INVESTIGATION OF PROSPECTIVE ELEMENTARY MATHEMATICS TEACHERS' CONCEPT IMAGES RELATING TO CONCEPTS OF BOUNDEDNESS-BOUNDLESSNESS

Mustafa Akdemir, Serkan Narli

Concepts of boundedness and boundlessness are related to order relations in mathematics. However, it can be said that students may not be aware of this relation. In this context, the aim of this study is to reveal prospective elementary mathematics teachers'concept images about boundedness-boundlessness of a set or a real interval on the basis of order relations. This research that is part of a comprehensive thesis study is descriptive and qualitative. In this research, a questionnaire that was made up of 12 open ended questions was applied to 100 first year students in the department of Elementary Mathematics Teaching at Dokuz Eylül University. After the pilot study, it was decided in the final form of the questionnaire that prepared by taking of the expert opinion. In this study, the data of the 4 questions with regard to boundedness-boundedlessness in the questionnaire was used. These questions are as follows: 1. May an infinite set be bounded? Explain. 2. May a finite set be boundless? Explain. 3. Is there any connection between the concept of order and concepts of boundedness and boundlessness? If yes, explain. 4. Is an empty set bounded or boundless? Explain. The data that collected evaluated by using of content analysis. Consequently, it is founded out that the participiants confused concepts of finiteness-infiniteness with boundedness-boundlessness and used them instead of each other. In addition to this, several concept images was identified with respect to the issue and it is identified that prospective students have some problems in determining concepts of upper bound and lower bound in order relations and in interpreting of these concept concerning concepts of boundedness-boundlessness.

THE INVESTIGATION OF THE USABILITY OF WEB-BASED ASSIGNMENT SYSTEM

Tolga Erdoğan, Osman Gazi Yildirim, Harun Çiğdem

Just as in all aspects of our lives, technological advancements have had an impact on traditional methods and techniques in education. The crucial reflections of this transformation in education have shown themselves in the increase of distance education and in the online content sharing, testing and assignment taking traditional methods' place. Online assignment is a model where tasks are given, student responses are submitted, results and feedback are shared on web. The usability of this web-based assignment system should be explored in order to use it effectively in class, identify and solve the problematic issues, and increase both instructors' and students' level of satisfaction. The aim of this study is to investigate the usability of web-based assignment system implemented in a vocational college. For research purposes, System Usability Scale scores of students were examined and students' opinions on web-based assignment were received to identify the points on its usability. In this mixed-design research, data were collected online from System Usability Scale (SUS) and students' responses to open-ended questions. The participants were 204 post-secondary students enrolling at a vocational college during spring semester of 2015-2016 Academic Year. Descriptive statistics and t-test were used in data analyses. The average score of 67.14 from SUS application showed that the system can be used. No significant difference was observed between first and second grades. The results of the qualitative analysis of those responses given to open-ended questions revealed that students enjoyed the system, instructor feedback had a motivating effect, but they had challenges owing to absence of enough time and difficulty at having access to computers and web-based assignment system. The results also showed that web-based assignments could be effectively used, but the ease of students' access to computers and internet should be taken into account before utilization.

Keywords: Online assignment, Usability, LMS

THE INVESTIGATION OF THE USABILITY OF WEB-BASED MATHEMATICS TESTING SYSTEM

Adnan Balci, Osman Gazi Yildirim, Harun Cigdem, Suleyman Ok

Due to technological advances, methods and techniques in education are revised and online -learning tools like videos, presentations, online assessment and assignment systems take the place of traditional methods. This transformation exerts a significant influence on mathematical education; online testing systems supersede usual paper and pen tests throughout time. Online testing system is a kind of examination which helps to student completing assignments and giving each student some feedback depending upon their responses on the web. The feedback form can be considered as a text or a video recording which includes the lecturer's answers for each questions. The usability of this web-based testing system should be investigated in an attempt to use it efficiently in mathematical education; includes appraising the performance of video-based feedback system, identifying and solving the problematic issues, and gaining satisfaction from both instructors' and students' knowledge. The goal of this study is to investigate the usability of web-based testing system implemented in a vocational college in which feedback is shared in the form of video recordings. The participants are post-secondary students using the system during spring semester of 2015-2016 Academic Year. For research purposes, System Usability Scale scores of students will be examined and students' opinions on web-based testing system will be evaluated to identify the points on its usability.

Keywords: Usability, Mathematics education, Testing system, LMS

THE PERCEPTIONS OF SOCIAL SCIENCES TEACHERS ABOUT FATIH PROJECT

Erol Koçoğlu

With the inclusion of student-centered education concept in the education-learning process in our country, various visual, audio, audio-visual, and technology-assisted materials, which are different from each other, have been brought into use. These materials leaving positive influences on the attention, motivation, and success levels of students increased the necessity for the use of additional materials in education. In this study, the purpose is determining the perceptions of social sciences teachers on Fatih Project by focusing on the support for student development with the help of technologic materials in education in our country. The Qualitative Research Method has been used in this study, and the content and descriptive analysis techniques have been used in data analysis. When the findings of the study are analyzed, it has been determined that the social sciences teachers have positive and negative perceptions on Fatih Project.

Keywords: Social sciences teacher, Project, perception.

THE PLACE OF THE HISTORY OF MATHEMATICS IN THE SIXTH GRADE TEXTBOOKS

Ömer Şahin, Kani Başibüyük, Yasin Soylu

Despite of great improvements in ICT (information and communications technology) the textbooks continue to be one of the most important learning materials (Aslan, 2010). It is stated that the presence of the historical development of math concepts in renewed middle school mathematics curriculum develops positive attitudes towards math among students (MEB, 2013). In other words, it can be said that the presence of the activities about the history of mathematics in the math textbooks is important for the development of positive attitudes towards mathematics among students. In this regard, the aim of this study is to thematically examine the activities about the history of mathematics in the math textbooks. In this study, the document analysis method of qualitative research designs was used. Documentary research is to examine the written, oral and visual materials providing the acquisition of information about facts and events aimed to be investigated (Yıldırım & Şimşek, 2011). In this study, in order to identify how to take place the history of mathematics in the 6th grade textbooks, the textbooks from two publishers were examined. The existence of the activities about the anecdotes, the old methods and the historical development of concepts of scientists is observed in the end of the study. It is observed that the activities take place mostly in the introduction of lesson of the math textbooks so as to get students' attention and to increase their interest and motivation. Moreover, the history of mathematics was also found in the sample questions and project works. However, it is stated that there aren't enough problem solving techniques in the history of mathematics in the textbooks. Additionally, it can be said that the activities concentrate more on teaching numbers and geometry. In the result of the study, it seems that there aren't enough activities about the history of mathematics in the 6th grade textbooks.

Keywords: History of mathematics, Lesson book, Learning activities

THE PROBLEM BASED STEM APPLICATIONS REGARDING "MATTER AND HEAT" SUBJECTS

Fatma Kamuran Girgin, Güliz Aydin

The objective of this study is to give information on the problem-based STEM activities and classroom applications that are prepared and developed for the 6th graders. STEM, an acronym that stands for Science, Technology, Engineering and Mathematics, is a multi-disciplinary approach in which the fields mentioned can be associated. The study was conducted with 24 sixth grade students in Konacık Cahit Özvezneci Secondary School in Bodrum district of Muğla province in the Spring term of 2015-2016 academic year. The students completed the problem-based STEM activities within the group-work during the 2 weeks (8 lessons period of time) allocated for the subjects of the unit "Matter and Heat" in the curriculum of the Science course. Before the implementation of the activities, the students were distributed the activity scenarios that include the problem cases and the necessary materials that might be required to form the designs of the groups. The students were then asked identify the problem and conduct STEM activities for the solution of the problems. The students were encouraged to come up with designs towards the solution of the defined problems within groups. There was no intervention made to students while they were preparing their designs but they were just guided during the process of the implementation of the activities. Students were given the environment in which they could just think, discuss and arrive at a consensus in order to form their designs together with their friends in the groups. This study illustrates the processes of the preparation and development of the activities, and their implementations in classroom environment in detail. It is thought that the problem-based STEM activities are going to be a guiding light for the in-class application researchers and teachers of Science course.

Keywords: Problem-based learning, STEM approach, Science education

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THE PSYCHOMETRIC PROPERTIES OF TEMA—3 IN A SAMPLE OF TURKISH PRESCHOOLERS

Kerem Avci, Mesut Saçkes

During the early childhood years children begin to acquire fundamental mathematical concepts and skills. These mathematical concepts and skills acquired by the children in the early years have potential to influence their further mathematical learning. Determining children's level of mathematical performances in early years may provide valuable information for educators in designing educational programs targeting children's with different needs. Nevertheless, instruments that produce valid and reliable measures of children mathematical performances are quite limited in the literature. This is particularly the case for the Turkish children. Therefore, the present study aims to examine the psychometric properties of the Test of Early Mathematics Ability (TEMA-3), which was developed by Ginsburg and Baroody (2003) in a sample of Turkish preschoolers. The TEMA-3 was previously adapted into Turkish by Erdoğan (2006). However, the psychometric properties of the scale have not been thoroughly examined in Turkish children. The sample of the current study included a total of 288 preschoolers, aged 48 to 66 months. Children were recruited from a publicly funded preschool in central districts of Balıkesir. The psychometric properties of the TEMA-3 were examined using the Classical Test Theory and Item Response Theory. The initial results demonstrated that the internal consistency of the scale was quite high (KR=0.95) and corrected item-total correlations ranged between 0.16 and 0.76. The initial findings suggest that the scale might be unidimensional.

Keywords: Early math ability, Early childhood educatin, Psychometric properties

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THE REFLECTION OF 8TH GRADE STUDENTS' STATISTICAL THINKING PROCESS

Nadide Yilmaz, Bahar Özüdoğru

This study aims to investigate 8th grade students' doing statistics and their while-activity experiences, behaviours and their difficulties. Firstly relevant class discussion of doing statistics was practiced and then different experiences of doing statistics about some conditions were provided. In class discussion process Ben-Zvi (2001) and Van de Walle (2013) were used. Students with group discussion created a scenerio related to identified condition and later started from this point of view to pose a problem. Afterwards, they collected data related to this problem which then organized, analyzed and interpreted the data. The data was collected in 4 lesson hours with participants consisted of 13, 8th grade students from a middle school. When data was analyzed, students faced some difficulties in each process. Students were observed to have a diffculty in creating the scenario. In the process of creating the problem, the students were observed to have found problems from the scenerio not from the analyzed data. While constructing a graph and analyzing the data, the students could only respond to the condition using one variable rather than the many problems that could be solved through data analysis. Starting from this point, some recommendations were given on opportunities to learning environment for providing the students with life experiences .

Keywords: Doing statistics, 8th grade students, Statistical process

THE REFLECTION OF PRE-SERVICE TEACHERS' CONTENT KNOWLEDGE RELATED TO HISTOGRAMS

Nadide Yilmaz

This study investigates reasoning process of pre-service teachers' to application, interpretation and construction of histograms in real world scenarios. In addition, revealing difficulties and misconceptions of pre-service teachers were aimed in this process. To this aim semi-structured interviews were conducted to 24 pre-service teachers. 6 pre-service teachers were studied in each grade level which gave an opportunity to describe each grade level pre-service teachers' reasoning process. In preparing semi-structured interview Lee and Meletiou-Mavrotheris (2003) questions and experts' opinions were used. While the interviews continued for 40-60 minutes, the data was analyzed using the content analyses. During the process of analysing, it was realized that the pre-service teachers had various difficulties in each grade level. Pre-service teachers' difficulties were in determining of histogram graphs' axis, understanding about the construction and interpreting of histograms which were employed to explain the concept of variability. In this study several suggestions were made in order to overcome these problems.

Keywords: Histogram, Pre-service teacher, Statistical reasoning

THE RELATIONSHIP BETWEEN INFORMATION LEVEL OF INDIVIDUALS REGARDING INFORMATION TECHNOLOGY AND THEIR PERCEPTIONS CONCERNING INFORMATION SECURITY: UNIVERSITY STUDENTS AS EXAMPLE

Faruk Süleyman Berber, Ecir Uğur Küçüksille

As a result of the developments experienced in information technology, many such services as bill payment, shopping, e-government transactions, access to libraries and information sources, finding the routes to go are possible to find in virtual worlds. Transferring all these businesses and operations to the IT environments comes along with the security problems. Because the threats, which come to the information shared in these environments, increse rapidly and show great diversifications, the importance of works to be done on the security of information is increasing with each passing day. Today, especially those information and communication devices having internet access are used extensively by individuals. Every day, many new threats, with which the individuals encounter while they are using these devices, and new measures to be taken against these threats can be added to the present ones. This situation requires users to keep up to date constantly their information on this subject. In this study, the data which is obtained by measuring the relationship between information level of university students concerninig information technologies and their perceptions about information security was shared, and measures which can be taken against information security threats and solution proposals were presented.

Keywords: Information security, Perception of information security, Digital threats

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THE RELATIONSHIP BETWEEN THE AMOUNT OF LEARNING AND TIME (THE EXAMPLE OF EQUATIONS)

Cenk Keşan, Deniz Kaya, Gökçe Ok, Yusuf Erkuş

The purpose of the current study is to determine the amount of time-dependent learning relating to the gain of 7th grade curriculum "students can solve problems that require to establish first order equations with a variable". The study, which has adopted scan model, was conducted with 42 girls and 42 boys, totally 84 students, at the 7th grade education level. An assessment instrument which consists of 10 open-ended questions was used as a data collection tool. The findings indicated that the learning group of 84 students fell behind in the level of mastery learning until 0.013. Girls reached the minimum level of mastery learning regarded as 0.987 with 3.2 lesson hours, boys reached that level with 4.0 lesson hours. Also learning groups reached some level regarded as 0.999 with 9.7 lesson hours, girls reached this level with 8.5 and boys reached this with 11.3 lesson hours. Moreover, as there was a decrease in the area under the curve belonging to the learning level-time graphic, there was also a decrement in the number of learning difficulties that the learning group encounter before. At the end of the study, the probability to determine nearest course hours to mastery learning level for each acquisition located in all levels of education and all the curriculums was offered as a recommendation.

Keywords: Amount of learning, Time, Equations, Seventh grade

THE REPRESENTATIONS OF PRE-SERVICE ELEMENTARY TEACHERS APPLIED IN SOLVING NON-ROUTINE MATHEMATICAL PROBLEMS

Ayten Pinar Bal

The study is a descriptive survey research which aims to find out the solution strategies applied by pre-service elementary in solving non routine problem types. The population of this study is 102 pre-service teachers who are educated in a elementary school department. As data collection tool, "Non-Routine Problem Set" , which was developed by related literature and expert reviews , was prepared. This problem set consists of ten non-routine problems. At the end of the study, it was found out that pre-service elementary teachers applied all representation types, including verbal, algebraic, graphical and tabular in terms of non-routine problem types. In addition, another important finding that obtained from the study is that while the pre-service teachers applied the algebraic representation most, they aplied the graphical representation least.

THE STRATEGIES USED BY PROSPECTIVE ELEMENTARY SCHOOL TEACHERS IN THE PROCESS OF PROBLEM SOLVING

Rezan Yilmaz, Faik Murat Sayici

A problem is a situation, which a person comes across with for the first time and feels the need to solve it, or whose solution is not already known. Problem solving is the complex process of eliminating that situation (Jonassen, 2000; Posamentier and Krulik, 1998). Problem solving especially possesses an important place among the skills, which are aimed to be instilled to the students (MEB, 2015; NCTM, 2000). Many studies have been conducted on the problem solving; and the process have been divided into classifications such as understanding the problem, devising a plan, carrying out the plan, evaluating the solution, while solution strategies such as guess-and-test, making a systematic list, reasoning, work backwards, solving simpler problem, drawing diagrams, using equations, etc. (Fan and Zhu, 2007; Johnson, 1949; Klausmeir and Goodwin, 1966; MEB, 2015; Polya, 1971). Whether the students have those skills depends on the competency of the teachers, who prepare the learning settings. However, there a very few studies conducted on the problem solvings of teachers and prospective teachers (English, 2002). This study has been carried out on prospective elementary school teachers, and the strategies they use throughout the process have been examined. The study with 126 participants has been conducted through qualitative research method, in which case study is preferred. The data were obtained through a document analysis, which contained the solution to an ''age'' problem at elementary school level; and coded in accordance with theoretical framework; and finally analyzed. The results suggest that the majority of participants prefer strategies such as guess-and-test, making systematic lists and the inappropriate strategy for elementary school level: using equations, whereas; a part of them prefer using strategies such as reasoning and drawing diagrams. Furthermore, there exist few prospective elementary school teachers, who incorrectly solve the problem or cannot solve it at all.

THE STUDY OF PSEUDOSCIENTIFIC BELIEFS OF SECONDARY SCHOOL STUDENTS

Hulusi Emre, Ayşegül Ergün

The current study aims to examine the levels of knowledge that secondary students have about the scientific method, while focusing on the distinction between science and pseudoscience. The findings were obtained via screening model. The sample of the study consists of 543 (267 female, 276 male) secondary school students. In this study " science, pseudo-science distinction scale" (α = .76) used that developed by Oothoudt (2008) and Turkish adaptation study Cetinkaya (2013) by the conducted. Science, Pseudo-Science Distinction scale consists of 23 items and 4 subscales. Hypothesis of the study were analyzed independent samples t test and one way ANOVA with SPSS. According to the research results it was found that the secondary students had a medium Level of Information About Pseudoscience, level of knowledge about the scientific method , the distinction between science and pseudoscience and Pseudoscientific Beliefs. There was no significant difference between of the Level of Information About Pseudoscience, level of knowledge about the scientific method , the distinction between science and pseudoscience and Pseudoscientific Beliefs according to grade level and gender.

Keywords: Pseudoscientific beliefs, Secondary school students

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THE USE OF DRAMA METHOD IN 7TH GRADE SCIENCE AND TECHNOLOGY COURSE SOLAR SYSTEM AND BEYOND: SPACE PUZZLE UNIT

Ayşe Gül (Çirkinoğlu) Şekercioğlu, Gamze (Yilmaz) Akkuş

There are many studies showing that teaching methods based on active learning are more effective than other methods for learning physics concepts (Demirci & Şekercioğlu (Çirkinoğlu), 2009; Crouch&Mazur, 2001; Boller, 1999). In this study, the effect of Drama Method to the success of the 7th Grade students about "Solar System and Beyond: Space Puzzle Unit" was investigated. In the spring season of the education and teaching year of 2014-2015, 44 students that study at a public school in Bigadiç in Balıkesir join at a work. In the study, quasi-experimental research design with pre-test/post-test control group was used. Our World and Universe Conception test was used as a data collecting tool. As a result of the analysis of the data obtained from the study, it was determined that the students study with Drama Method whose Our World and Universe test marks were higher than the control group students that study the lesson with 7th Grade MEB program. And this difference in points between groups was found at a more statistically significant level in favor of the test group. The data of the last test T test's p value is found 0,48 (p

Keywords: Drama method, Space, Universe, Solar system

THE USE OF EDIBLE SCIENCE PROJECTS IN TEACHING SCIENCE CONCEPTS

Arif Çömek, Mehtap Yildirim, Zehra Betul Alp

Students have difficulty in learning the concepts of science and similarly teachers have difficulty in teaching the concepts of science. In order to overcome these difficulties, different teaching methods are tried and it is attempted to attain success. Educators usually study the question of "how can we provide an easier and more permanent teaching?" As a solution to this problem they agree that activities which draw the attention of the students and which the students get pleased and entertained while doing enable the effective learning in teaching the concepts of science. In this regard project-based learning is one of the effective methods. However, it is not often preferred by the teachers due to the problems in the supply of materials and being long-term activities. Thus, primarily students were made to experience a scientific process by using the processes of project-based learning and a method which had an easy and cheap material supply was used in the study. By using the materials which everyone could buy easily and in a cheap price, senior students of Education Faculty were made to do edible projects. For these projects, students were divided into groups of two people and each group modelled a concept of science that they chose themselves by using edible materials such as sugar, cake, chocolate, pasta. In total, 15 groups of two people developed 26 different projects. These projects were mostly made by using the concepts of science such as cell, DNA, RNA, mitosis and meiosis, brain, atomic models, periodical table, planets, solar system and earth's crust. These projects were later exhibited and they were introduced and presented to the other students in the Faculty. It has been observed that the students' awareness for the concepts of science increased while the projects were being done and exhibited. It has been observed that this presentation drew attention as students tasted the models and shared them with the other students. It is quite important that these projects are introduced and published in order to popularise the use of such projects in all levels of teaching. For this purpose, it is aimed to discuss how these projects are going to be used in science teaching and the contribution of such projects to science teaching by explaining how these twenty six projects were done.

Keywords: Science concepts, Science education, Edible science projects

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THE VIEWS OF STUDENTS THAT INTENDED PROCESSING 5E MODEL 8TH GRADE LEVEL IN ACID-BAS ISSUE

Ali Akinci

The aim of this study is to determine the view of 8th grade students's related to processing via 5E Model in Acid-Bas issue in Science and Technology course. This study was carried out two weeks, which publich secondary school located in Ankara, in 2015-2016 education-teaching autumn mid-term with 20 8th grade students. In this context, several activities were prepared which are suitable in Acid-Bas issue oriented to 5E Model. Qualitative research method was fixed of this study. Case study strategy was used in this research. Interview techniq was used for obtaining datas of this research. In this context, has validity realibity a semi-structured interview form was prepared which have 5 items. Description analyse tecniq was used for analyzing of interview datas. It can be said that the students stated they liked science and technology courses and has incresead their interests to course which processed via 5E Model. They are among recommendations that science and technology courses processing via using 5E model.

Keywords: Acid-Bas, 5E Model, Description analysis

THE WORD "EDUCATION" IN SOCIAL MEDIA

İlker Türker, Serhat Orkun Tan

The word "education" ("eğitim" in Turkish), which can be expressed as a systematic way of giving the knowledge and skills to the individuals, is mentioned frequently in social media. The fastest-growing network twitter is also the optimal platform to get information from the usage of the "education" word by social communities. From this point of view, utilizing from twitter this study aimed to investigate how the word "education" is used in social media. The usage frequency of the word "education", the most frequently used terms together with the word "education" and also the location information of education tweets were acquired to evaluate the comments of the individuals on this word. The followings and followers numbers of the people who share "education" word in social media are also stated to investigate the correlation of the word usage with the user popularity.

Keywords: Education, Social media, Social networks, Term frequency, Trend analysis

THEORETICAL FRAMEWORKS IN THE ADOPTION OF MOBILE LEARNING

Ismail Çelik

Recent developments in technology lead mobile devices to become common, convenient, and inexpensive. Mobile learning takes place when the learner is not at a fixed, predetermined place, or when the learner takes benefit of learning opportunities offered by mobile devices. Prevalent access to mobile technologies and the opportunity to learn regardless of time and place make the mobile learning an essential tool for education. Mobile learning attracts learners' attention, increases collaboration among learners, can be implemented through a simple design composed of small and different pieces of information and can be dynamically updated. The success of m-learning may depend on whether or not students are willing to adopt the new technology that is different from what they used in the past. Hence, adoption of m-learning by learners is critical to the effective implementation of m-learning systems. Relevant m-learning literature indicates that many studies have investigated how and why learners adopt m-learning based on numerous theoretical frameworks. Technology Acceptance Model (TAM); Diffusion of Innovation Theory (IDT), Theory of Reasoned Action, Motivation Model (MM), Theory of Planned Behavior, Combined TAM and TPB (Taylor & Todd, 1995); Model of PC Utilization, and Social Cognitive Theory (SCT) are some of the theories taken as theoretical bases in the adoption of m-learning. A large majority of the researchers have studied the adoption of m-learning within the framework of TAM.

Keywords: Mobile learning, Adoption, Technology acceptance

THINKING WITH SIX HATS ON TEACHING MATHEMATICS VIA EDUCATIONAL TECHNOLOGIES

İsmail Şan, Sultan Şan

The purpose of this study is investigating the views of elementary mathematics teacher education students on teaching mathematics via educational technologies. For this purpose some of educational technologies (prezi, padlet, socrative, gradecam, weebly) was presented to the student teachers in laboratuary. After that, they asked to write their views about these technologies in the light of six thinking hats technique. The working group of this study is composed of 108 student elementary mathematics teachers that enrolled Instructional Technologies and Material Design course, in Inonu University, in 2015-16 spring semester. Study is at the collecting data step. After collecting data, descriptive analysis method will be held to interpret the data. The views will be clustered and evaluated according to meaning of the "six thinking hats".

Keywords: Educational technology, Six thinking hats, Teaching mathematics

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TOMATO PRODUCTION IN POWDER: A TOMATO CONSERVATION TECHNOLOGY TO SUPPORT THE COMMUNITIES AND METHODOLOGICAL PROPOSAL FOR CHEMISTRY CONTEXTUALIZED EDUCATION

Djabrú Manuel, Gerre Sithole

The tomato is a very produced food in Mozambique in particular in the District of Gorongosa .This product although it is often used in the confession of food, have little time left paradoxically rich in vitamin C, lycopene and also contains the β -carotene. Both belong to the family of carotenoids, terpenoids (provitamin A). In operation of the human body are given rise to a series of chemical reactions where mostly formed free radicals (unstable and reactive) that react rapidly with various compounds and cellular targets, in many of these reactions can damage DNA, proteins lipids, carbohydrates, etc. causing various diseases that affect humans. The tomato has β -carotene and lycopene are carotenoids act as an antioxidant because of their conjugated double bonds susceptible to oxidation under the action of light or oxygen. The study was dedicated to the determination of carotenoids (lycopene and β -carotene) in tomato powder and fresh. The motivation for the study came from research on production of dried tomato funded by the Ministry of Science and Technology powder through the National Research Fund, categorized as a project of Innovation and Technology Transfer, held in 2013, instructing associations Báruè Districts and communities Gorongosa District through a team of teachers, students and accompanied by representatives of the Government and institutions. Because tomatoes have little shelf life and important game against vitamins and natural antioxidants, after successfully obtaining the tomato powder, to be a viable and recommended alternative for communities urged the need to do laboratory analysis of carotenoids in it existing and comparing with the fresh tomato. Analyses for determination of carotenoids were made in different laboratories (UP- Beira and Chimoio – UCM), but all were with the help of the spectrophotometer, differed in laboratory reagents and other materials. As other nutrients such as sugar and vitamin C could somehow influence the activity of the microorganisms etc. was also performed analysing sugar levels in fresh tomato based refractometer. The survey results show that the extraction of carotenoids is made with use of organic solvents and subsequent identification using various methods such as high performance liquid chromatography (HPLC), calorimetry, thin layer chromatography (TLC) and spectrophotometry. It is also noted that processing of carotenoids caused an increase and decrease in sugar and vitamin C (ascorbic acid). It follows that in 100kg of fresh tomatoes are obtained 6kg of tomato powder and that levels of carotenoids such as lycopene both β-carotene in tomato powder are larger than fresh tomatoes according to the processing mode used.

Keywords: Tomato powder, Fresh tomato, Carotenoids (lycopene and β –carotene), Processing, antioxidants

TRAINING PRESERVICE TEACHERS WITH A SAFE ENVIRONMENT: SIMSCHOOL

Muhammet Demirbilek

Pre-service teacher training has a vital role in preparing future teachers to deliver content knowledge, develop skills and foster attitudes that will enable learners to reach their potential in educational institutions. Equipping teacher candidates with the professional skills needed in schools and other learning contexts is the key purpose of preservice teacher training. Training preservice teachers in a game like simulated classroom environment may reduce the time and cost needed in real training and also may help preservice teachers to grasp the context of today's classroom. Furthermore, game like teacher training simulations may offer the preservice teachers the ability to replay repeatedly the simulated experience in different circumstances. SimSchool is a scalable digital media learning platform for improving the preparation of teachers, which can potentially enhance the recruitment, training and continuing professional development of educators. It is designed to provide pre-service teachers with a safe environment for experimenting and practicing new techniques, especially methods of addressing different learning styles, and wide variations in academic and behavioral performance of students. Provides easy and quick reference inventory by which to assess people's preferred learning styles, and then most importantly, to design learning methods and experiences that match people's preferences. This paper presents a framework for using SimSchool web-based dynamic simulation environment for experimenting and practicing new techniques, especially methods of addressing different learning styles, and wide variations in academic and behavioral performance of students.

Keywords: Teacher training, Simulations, pre-service teachers, Simschool, Classroom management

TRANSFERING GAME HABITS TO NEW TECHNOLOGIES IN EDUCATION

Süleyman Burçin Şuyun, Şakir Taşdemir, Selahattin Alan

Popularity of computer games are increasing rapidly in today's world. In addition to games which children play to spend their free time, digital games which are played by using technological machines have become an indispensable part of life nowadays. In this information and technology age we live in, the effects of the games on education cannot be denied. In the scope of this study, an educational game has been designed by analysing the games which are played often by students and have an important place in the game world, and by considering their particular characteristics. So, it has been aimed the students to increase interests to lessons and educational games. In this context, a game has been designed to teach mathematical operations to students. In the game design, we made use of the destructive feature of Tetris game and the visual feature of Candy Crush Saga game, which are popular games in the game world. In the game, four different circular geometric shapes and their features like hit, jump and push are used. Thus, a game is designed for children to learn in an enjoyable way.

Keywords: Game habits, Education, Geometric shapes, Game design

TRANSLATION, ADAPTATION AND VALIDATION OF STUDENT ATTITUDE TOWARD STEM SCALE FOR USE IN TURKEY

Selçuk Arik, Elif Açil, Meral Çelikoğlu

The aim of this study is Turkish adaptation, validation and reliability of "Student Attitude toward STEM" which wasdeveloped by Mahoney (2009). The study sample was created with 1000 student studying for ninth, tenth, eleventh and twelfths grade in Gaziosmanpaşa High School, Tokat Anatolian High School, Tokat Milli Piyango İhya Balak Science High School, Atatürk Anatolian High School, and Mehmet Akif Ersoy Anatolian High School in Tokat. Regarding the validity of scale principal component factor analysis to varimax rotation was conducted. Item-total test correlation has been calculated for purpose of item validity. To acquire more evidence for structure validity, it was questioned that if there are significant differences in scale scores of student with respect to their class level. As a consequence these analysis results which disclosed theoretical framework in literature have been put forth.Finally, test-retest reliability was made for the entire scale and the validity and reliability process of research has been completed. The study is still continuing. Therefore, the findings and conclusions related to the research will be presented at the conference.

Keywords: STEM scale, Adaptation, High school students, STEM attitude, Validation

TURKISH TEACHERS' TPACK CHARACTERISTICS: AN ANALYSIS WITHIN THE FRAMEWORK OF FATIH PROJECT

Yusuf Ay, Engin Karadağ, M. Bahaddin Acat

TPACK (Technological Pedagogical Content Knowledge) addresses the three different skills of technology, pedagogy and content together rather than considering them independently. TPACK involves the presentation of the subject area for effective teaching within the framework of pedagogical approaches in environments that involve the use of technology. The purpose of this study is to identify the differences in technology integration of the teachers who work in Turkey and analyze them according to various variables on the basis of technological pedagogical content knowledge. Data used in the study were collected from 296 teachers using Technological Pedagogical Content Knowledge-Practical Scale (Yeh, Hsu, Wu, Hwang and Lin, 2013) and Attitude towards Technology Scale (Yavuz, 2005). The data were analyzed using Ward\'s minimum variance hierarchical clustering analysis, discriminant function analysis, ANOVA, one sample t-test, correlation analysis and Chi-square independence test. According to the results of the study, it has been found that the focuses of teachers' technology integration were grouped in the following clusters, according to their technological pedagogical content knowledge: (i) activity-based, (ii) student-based and (iii) topic-based clusters. FATIH project and school categories affected clusters however, gender and seniority did not affect the clustering.

Keywords: Technology integration, Technological pedagogical content knowledge, Cluster analysis

TURN YOUR PHONES ON: USING ANDROID DEVICES TO COLLECT SCIENTIFIC DATA

Matt Cochrane

Data logging devices have been in use for about three decades but they have never quite developed into the automatic choice of device for taking measurements in educational contexts. This article reviews the reasons for this, citing difficulties with setting up, dealing with the software, and overcoming hardware incompatibilities. The literature suggests that these factors have discouraged many science teachers from embedding data loggers into their teaching. Research by providers shows that 80% of teenagers now possess Android devices in the form of a mobile phone (cell phone) or tablet, and many schools have introduced schemes which supply pupils with their own tablet device for use in lessons. Android devices are now supplied with a range of sensors which can be relatively easily used for the capture of useful data in the Science laboratory. This paper evaluates four experiments carried out using a mobile phone to collect the data. The experiments are described in detail, and the errors are analysed to evaluate the effectiveness and accuracy of the device in each experiment. The measurements were taken making use of Apps which were downloaded free of charge. The Apps were used in collecting data to measure audio frequencies, magnetic fields from an electromagnet, the acceleration of a moving body, the and the coefficient of restitution of a bouncing ball. Data and images are presented to enable the audience to carry out and extend the experiments for their own use.

Keywords: Dataloggin, Cellphone, Android

UNIVERSITY STUDENTS' UNDERSTANDING OF DENSITY AND CONCENTRATION: A CROSS-LEVEL INVESTIGATION

Nuri Nakiboğlu, Canan Nakiboğlu

The concepts of density and concentration are the fundamental concepts that occur at all levels of chemistry education from middle school to university levels. On the other hand, both concepts and difference between them are not easily grasped by the students. Density is a characteristic property of a pure substance and directly related to mass. Concentration is defined as the amount of one component in a matter which contains more than one component. There are several types of concentrations defined. However, density is often confused with concentration. When university students are asked to define the density, it can be seen that they can define the concentration instead of density. In this study, it was aimed to explore all level university chemistry students, from freshmen to the students who graduated from the university chemistry departments, how students define the concepts of density, concentration and solvation which are the fundamental and basic concepts of chemistry. Qualitative data were gathered in a test composed of 3 open-ended questions distributed to 135 university students comprising two different academic institutions: Education faculty and science and art faculty. Students were asked to provide a written description of three concepts. The data were analysed by using both content analysis method and a concept-evaluation scheme. It was found that students had different understanding levels concerning three concepts and problems to description of them. Too add, students had problem concerning concept of mass which is pre-requisite concept for density. The reason of the students' difficulties about density and concentration can be related to nature of these concepts that involve proportional reasoning.

Keywords: University students, Understanding, Density, Concentration, Solvation

USABILITY AND PERFORMANCE ANALYSIS OF MEB WEBSITE

Mehmet Sevri, Sedat Hakyemez

According to Internet usage statistics; Turkey's estimated number of Internet users is 46.2 millions, which is 59.6% of the country's population, by November 2015. When people need information on a subject, the first source they refer to is the related institution's website. Design and usability of websites are important for users to rapidly and easily access to the information they demand. Ministry of National Education (MEB) website serves many users including millions of students and their guardians. In this study, MEB website's task based performance analysis and usability analysis according to Xerox heuristic scala are performed. The usability and human interaction level of this website, which belongs to a very important government organisation and is visited by multitudinous users, are determined. Website's inadequate parts are reported.

Keywords: Usability, Human-computer interaction, MEB, Website

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USE OF TEXTBOOKS AND ONLINE HOMEWORK SYSTEMS IN APPLIED CALCULUS

Murat Akarsu, Brooke Max, Elizabeth Kersey, Lane Bloome, Elizabeth Souza, Andrew Hoffman

In order to evaluate a curriculum, it must be known how students are using it. However, the opportunities for use afforded to students by curriculum are changing with technology. The purpose of this study was to discover how undergraduate students in applied calculus use the written curriculum such as textbooks and online homework systems in their course. The study drew on three data sources: (a) online survey, (b) observations, and (c) interviews. Students' survey responses indicated that, while not many students referenced the textbook, those that did preferred to use textbooks for finding worked problems, finding formula or definitions, and doing homework problems. The observations and interviews revealed that students responded to negative feedback by checking computations and for formatting errors.

Keywords: Curriculum, Post Secondary, Technology

USING STEM INTEGRATED APPROACH TO NURTURE STUDENTS' INTEREST AND 21ST CENTURY SKILLS

Mohamad Sattar Rasul, Lilia Haim, Zanaton Iksan

Student nowadays need to be motivated and prepared with 21st Century skills to ensure their competitiveness. This study aimed to identify the interest and 21st century skills among students after participating in STEM programs done by The National University of Malaysia. The fundamental pedagogical approach used in the program was by connecting Project Oriented Problem Based Learning (PoPBL) with real context issues/world grand challenges which is energy, transportation, urban infrastructure and wireless communication and integration of STEM elements. A series of programs have been conducted since 2013 to 2015 involving 4 different STEM Camps and a total of 578 school students from lower secondary age 13-14. The findings from this study revealed that, the interest and 21st century skills among students were significantly increase. The outcome of this study provide evidence that the application of Po-PBL in STEM education helped students to nurture interest and enhance their 21st century skills by using real world problems, authentic and real life experience through project work.

Keywords: STEM, Interest, 21st century skills, Po-PBL, STEM education, Project based learning

USING THE POWER OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) TO ENHANCE TEACHING AND LEARNING IN SCHOOLS IN AN EMIRATE IN UAE: A STUDY REPORT

Justina O. Osa, Lee Edward Waller

Information and communication technology (ICT) is an indispensable part of the 21st century world and has invaded all aspects of life and society. The field of education has not been unaffected by the penetrating and invading influence of information and communication technology. A close look at teaching and learning in schools today confirms the desire and attempts of educational systems to take full advantage of the power of ICT to accelerate, enrich, and deepen teachers and students knowledge and skills, motivate and engage students in learning, strengthen teaching, and provide opportunities to make schools more efficient and productive. The use of ICT has been an important topic of discussion and research in education. The presenters conducted a study to investigate the use of ICT in schools in a northern emirate in the United Arab Emirates. This proposed presentation will share findings from the study specifically on: (1) how teachers are prepared to use ICT in their instructional activities; (2) how teachers actually use ICT in their instructional activities; (3) how students use ICT to enhance their learning; (4) support provided for teachers and student to effectively and efficiently use ICT for teaching and learning; (5) road blocks encountered by teachers and students in using ICT for teaching and learning; and (6) suggested solutions to the challenges posed by the use of ICT in teaching and learning. Session attendees will have opportunity to comment on the contents of the presentation and to share relevant information and their experiences on the use of ICT to enhance the quality of teaching and learning.

Keywords: Educational technology

VARIABLES THAT PREDICT PERCEPTIONS OF PARENTS ABOUT THEIR OWN CHILDREN'S LEVELS OF INTERNET ADDICTION

Ahmet Oğuz Aktürk, Sena Köksoy

The study aims to analyze some variables that predict perceptions of parents about their own children's levels of internet addiction. 214 middle school students studying at a city located at the middle of Turkey and their parents voluntarily participated in the study. Relational survey model was used as research methods. Data collected by using "Perceived Social Support Scale" and "Parental Attitudes Scale" on students and "Parent-Child Internet Addiction Scale" on parents. The results showed that authoritarian attitudes of the parents of students that perceived by students was a predictor while democratic attitudes and perceived social support from family were not a significant predictors for perceptions of parents about their own children's levels of internet addiction.

Keywords: Internet addiction, Parental attitudes, Perceived social support, Multiple linear regression analysis

VARIATIONS ON OPEN PLAY WITH INTERACTIVE COMPUTER SIMULATIONS AND THEIR IMPLICATIONS FOR STUDENTS' OPPORTUNITIES TO CONTRIBUTE TO MATHEMATICAL DISCUSSIONS

Ian Whitacre

In lessons involving computer simulations (sims), there are advantages to allowing students to have a period of open play with the sim before engaging them in more substantive activities. Open play allows students to become familiar with the sim and to take more ownership for their learning. A previous study focused on PhET interactive sims revealed that a science lesson that began with open play featured significantly more focus on student ideas and science content than the same lesson taught without open play. The present study focuses on the use of PhET sims in middle-school mathematics classrooms. Four teachers participated in a workshop on the use of PhET sims, which recommended open play. All of the teachers subsequently incorporated open play into their sim-based lessons, but they did so in different ways. This study examined the different versions of open play that took place in a set of sim-based lessons, compared the characteristics of the open play and follow-up discussion to other phases of the teachers' lessons. We found that certain versions of open play afforded students unique opportunities to contribute. Consider two contrasting cases: Amy ran her class in a very efficient and directed manner. Open play was brief, and it led directly into the main lesson activity. Opportunities for student contributions were narrowly constrained. In Nancy's class, by contrast, open play was followed by a substantial discussion. Several students shared their discoveries, and discussion of these led to significant mathematical points, some of which were tangential to the primary learning goal for the lesson. The discussion following open play was the most mathematically rich phase of Nancy's lesson, and it contrasted with typical interactions in Nancy's class, which rarely made substantive use of students' ideas.

Keywords: Computer simulations, Discourse, Student ownership

VIEWS OF SCIENCE TEACHER CANDIDATES ON TEACHING A LESSON IN LABORATORY AND EXAMINATION OF THE EXPERIMENTS WHICH THEY IMPROVE

Sibel Demir Kaçan

It is an indisputable fact that laboratory lessons are very important in science education. Having qualified lessons may be effective for younger generation to gain different perspectives. There are so many factors in teaching a qualified laboratory lesson such as material used, equipment, place and experiments to be conducted. The experiments to be conducted are one of the most important elements of a good quality of a laboratory lesson. Selection and implementation of an efficient experiment or experiments, are very important to have a qualified laboratory lesson. In accordance with this importance, the science educators studying in faculties need to have certain abilities in terms of laboratory competency and experiment editing skills. Based on this expectation, the aim of this study is to identify the suggestions, regarding the operation of laboratory lessons, of teacher candidates who study at science teaching department in 2nd grade and to examine the experiments that have been created by these teacher candidates. This study has been conducted with 80 2nd grade students who study in science teaching department of a university in Black Sea region of Turkey. Two open-ended questions have been asked to the teacher candidates in the study as an obtainment tool. The data which were obtained in open-ended questions have been evaluated with content analysis. According to Büyüköztürk et al. (2008), content analysis is defined to be a renewable technique in which some words of a text are summarized with smaller content categories by means of coding. In consequence of the results that have been obtained in the study, interpretations have been made and suggestions have been offered with the purpose of enlightening other researchers.

Keywords: Laboratory, Science education, Experiment, Teacher candidate

VIEWS OF THE STUDENTS OF THE FACULTY OF EDUCATION ABOUT THEIR BELIEFS RELATED TO LEARNING

Hasene Esra Yildirir, Ayşe Gül (Çirkinoğlu) Şekercioğlu

This research aims to determine the views of the 56 students of the education faculty who are studying at Balıkesir University Necatibey Faculty of Education Elementary School Maths, Science and Secondary School Departments about their epistemological beliefs. To this end, semi-structured interviews were made with students. In these interviews, the interview questions which were used in Topçu's (2011) study were used. Each of the questions which were used in the semi-structured interviews was prepared to involve the epistemological belief dimensions which were recommended by Schommer (1990). These dimensions are "simple knowledge", "certain knowledge", "quick learning" and "innate ability". Semi-structured interview records were converted into written text and content and descriptive analysis was made according to the themes set forth by the questions. As a result of the analyses, it was determined that students linked the learning with the dimension "innate ability" to effort and they thought that the inborn skill could be developed by effort, and the majority thought that knowledge structuring in the learning process varied slowly and by person for the dimension "quick learning". As for the dimension "certain knowledge", a great majority of students had the three views which were namely knowledge certainly changes, knowledge changes based on its field, and knowledge does not change. As for the dimension "simple knowledge", the majority of students stated that words have several meanings, that people ascribed meanings to words based on their experiences, and that there is no single correct answer for the problems in science because knowledge changes in time and scientists bring different solution suggestions for problems.

Keywords: Epistemological beliefs, Students of the education faculty, Views

VOICES FROM MATHEMATICS TEACHERS: WHAT DID THEY HAVE EXPERIENCED IN THEIR EARLY CAREER?

Özge Keskin, M. Sencer Çorlu

Teachers' further success and commitment to their job were shaped by their experiences in the early career of teaching. Being aware of the problems that beginning teachers face would be helpful to shape teacher education practices in a way that would support pre-service teachers become more ready and effective in early years of teaching. Aligned with the purpose, semi-structured interviews with 10 secondary school mathematics teachers were conducted in order to shed light into their early year practices. Content analysis were conducted and three themes were emerged. Being a part of a larger doctoral dissertation study, the results of this research provided reflections on both teacher and context related challenges that teachers faced. The mismatch between expectations from teaching and the reality was raised as an another important finding . The perception of teachers that there is a gap between theory and practice stands as an issue that must be considered carefully by teacher educators.

Keywords: Beginning teachers, Mathematics educatio, Theory-practice gap

WHAT DO 6TH GRADE STUDENTS THINK ABOUT THEIR LEARNING ENVIRONMENT IN SCIENCE CLASSES?

Esra Çağinda, Gökhan Özdemir

The purpose of the study is to evaluate students' views on their science learning environment with regard to the properties of constructivist approach. The sample of the study consisted of 48 sixth grade students who were studying in a middle school located in a developed city at the central Anatolia region. Constructivist Learning Environment Survey (CLES) developed by Taylor, Fraser, and Fisher (1997) and adopted by Küçüközer, Kırtak, Ayverdi, and Eğdir (2012) into Turkish was used as the data collection tool. The data were analyzed descriptively. The results of the study indicated that even students' learning environment had several characteristics in common with the elements of constructivism, students' learning environment was weak in terms of students' questioning and the collaboration between students and teacher in lesson planning, instruction, and assessment. The results imply that democratic learning atmosphere was missing in the science classes.

Keywords: Constructivism, Learning environment, Science education, Science learning

WHAT DO PRE-SERVICE ELEMENTARY SCHOOL TEACHERS THINK ABOUT KEEPING JOURNALS?

Faik Özgür Karataş, Canan Cengiz, Suat Çelik

Learning logs give students opportunity to think about their learning experiences and learning processes. By keeping journals, students are expected to process the stimulus they received and knowledge they gained, and then develop their own learning and thinking skills. Determining participants' views regarding to keeping learning journals is important to find out the gap between expectations and perceptions to perform these activities more effectively and efficiently. The purpose of this study is to determine the pre-service elementary teachers' views related to the journals which they kept for ten weeks in Science-Technology-Society (STS) class. The pre-service teachers' journals were collected; and reviewed by one of the authors; provided feedback; and marked based on a rubric. The following class, the journals were handed back to the participants to write their journals after the class. This study was conducted with 33 senior pre-service elementary teachers (20 female and 13 male). The pre-service teachers' views regarding to keeping weekly journals in STS class was examined with a questionnaire adjusted from another study by the authors. The questionnaire consists of eight open-ended questions in an online-form for the participants to fill out at the end of the semester. The pre-service teachers' responses were analyzed inductively based on the main themes on the questionnaire. Analysis of the responses revealed that even though a few pre-service teachers stated that they find keeping a journal is boring and difficult at the beginning, their views were changed over time and the most of them indicated a positive effect of journals on their learning. As the pre-service teachers were aware that they would write an entry in their journals after the class, they listened to the lesson more carefully and they took notes during the class. It is also found that they find learning logs effective in permanent learning, recitation, connecting existed and newly gained knowledge and self-evaluation.The most negative criticism was about shortage of allocated time for keeping reflective journal.

Keywords: Journal, Science technology society, Pre-service teacher, Reflection

WHICH TYPE OF VERBAL PROBLEMS DO THE TEACHERS AND EDUCATION MATERIALS PRESENT TO CHILDREN IN PRESCHOOL PERIOD?

Yaşare Aktaş Arnas, Şule Saribaş

Addition and subtraction are among the basic issues of mathematic education in early childhood period. It is important that the addition and subtraction problems to be presented as verbal problems in order for preschool children to be able to solve these problems. The studies about the verbal problem solving of preschool children reveal that all of these problem types (combination, seperation, part-whole, comparison) must be presented to the children in order to be succesful at verbal problem solving. This study examines the types of verbal problems presented in the educational materials (books and magazines) which prepared to teach basic mathematical skills to the children between the age of three and six and presented by teachers in mathematical activites. The present study was designed with the mixed method. The sample of this study consists of preschool teachers who work at the preschools bound to central district of Adana and agreed to take part in the study; and the published sources about mathematic education of 12 publishers which are chosen with the 20% sample out of 60 publishers which prepare educational material about the preschool mathematics education. With the aim of obtaining data a survey - including the sample questions of verbal problem types- applied to teachers; and also published mathematic education materials are used in the study. In the study while the data obtained from the survey is analysed with the quantitative analysis method, the books and magazines are analysed with content analysis. The percentage and frequency distribution of obtained data is calculated. The obtained findings will be argued in the light of literature.

Keywords: Verbal problems, Mathematic education, Material analysis, Preschool

WORK BASED LEARNING AND EMPLOYERS ENGAGEMENT

Moofik Al-tai

There is a growing demand on universities to produce graduates who can make immediate contribution to employments. Work Based Learning (WBL) should make contribution to this demand. WBL should be incorporated in a modern course curriculum. Employers should be engaged in the curriculum design, content, organization and in some cases delivery and assessments. This paper will deal with the current education challenges. It will consider issues relating to WBL and employer's engagement in teaching and learning. These will include general processes the universities may explore in order to improve the way in which they engage employers, understanding employer needs, communication mechanism, method of engagements, course developments, Universities' income generation from employer engagement and the importance of engaging employers. The paper will also deal with the current higher education teaching and learning issues and challenges. It will also consider other issues relating to various methods of learning including face to face learning, work-based learning, distance learning and blended learning which are important for engineering and technology courses. Universities may explore these learnings in order to improve their students' success.

Keywords: Universities, Education challenge, Learning, Employers engagement

IMPLEMENTATION OF THE INFORMATION AND COMMUNICATION TECHNOLOGY IN LEARNING

Azir Aliu, Artan Luma, Halil Snopce

Information and Communications Technology (ICT) has a great importance in all aspects of life, including education as well. With the fast technology progress, its implementation in education is inevitable. This paper shows the implementation of ICT in education, beginning with its definition, indicators, techniques and methods of implementation, the obstacles that the implementation faces, and some good implementation practices performed in Mathematics. All the above mentioned aspects are described in this paper including the cycle of subject organization through ICT, which is followed by the creation of electronic files for teachers and students illustrated by an example of the way of organizing these files. There is also discussed for the lesson planning in Mathematics using available applications for each teacher in the R. of Macedonia. This research covers the teachers of the R. of Macedonia of different ages which come both from elementary and high schools. We show the level of Information and Communications Technology usage in education; the obstacles for not implementing it by the teachers; the ways of communication between the teachers; student arrangement and grouping while using Information and Communications Technology; types of applications that the students use; the impact of the ICT on the students; the impact of the ICT on the role of the teacher; the ways of evaluating the students' work by using ICT. Some of the results found by this research are compared by the results found by the research done by the Institute for Applied Social Science(ITS) with teachers from Germany, Ireland, Spain, Netherlands and Belgium.

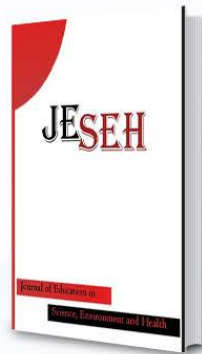**Keywords:** Ict, Indicators, Standards, Methods, Implementation

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