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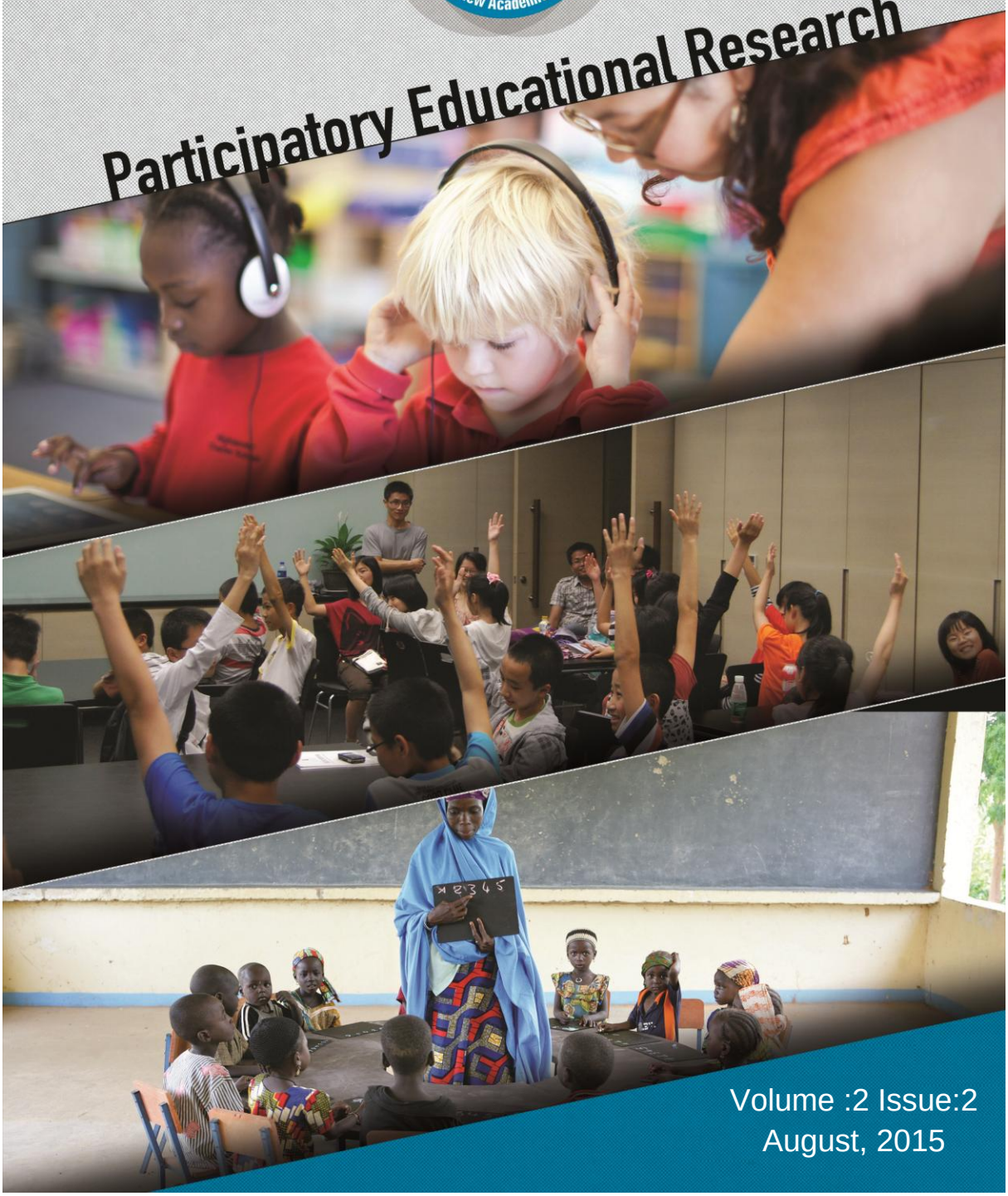

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TABLE OF CONTENTS

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The notion of Charter Schools and Its Feasibility in Turkey

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The purpose of this study was to investigate the feasibility of Charter School system in Turkey, which was opened firstly in State of Minnesota of United States and was expanded to approximately 40 states in America today and also, in practice in some countries such as Canada, New Zealand, United Kingdom, Sweden and Norway. Charter Schools are educational institutes that can be opened by signing a contract between a country's institution responsible for education and a person or a group who wants to be responsible for the management of this school. This system was based on performance and accountability and pursued more competitive and innovative goals. Moreover, Charter Schools put emphasis on democracy and equality in education by being free, addressing to all students living in the region where school was located and considering individual differences and diversity on behalf of students. Eight volunteering faculty members were chosen by criterion sampling who were working in the field of Educational Sciences of universities in Turkey. Interviews were conducted with participants who were informed about the structure and operation of this system in advance. The results of the study suggested that Charter Schools were advantageous in terms of individualism, diversity and flexible curriculum though flexible curriculum, monitoring and audition process could lead to some problems when it was practiced in Turkey.

Introduction

The notion of Charter Schools was firstly brought to agenda in United States of America with the "Education by Charter" article which was published in 1974 for the first time. Budde (1988) derived from the topics on the agenda of National Education Commission reports and forums about education and economics which was held in 1980s. Those reports and forums revealed that United States fell behind in comparison to its opponents in the areas of trade, industry and technological innovation and it was emphasized that learning was an indispensable investment in the new information age. American kids were unaware of their

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past and unprepared to future and this ended up with not only dropping out but also abstraction from being a member of a productive society; better schools meant better jobs and unless finding an answer to these problematic issues, Americans could no more maintain their high living standards. Based on these results, Budde called for an educational reform and brought out the notion of Charter schools for the purpose of reorganization of schools. Because United States could not get up to date with new informatics age where knowledge and power are reproduced, this problem created a need about the reconstruction of educational institutes. Besides, as Bowles (2014) stated that, there were political and cultural conflicts in 1960s, economic inequality as a major problem was perpetually brought forward by minorities, women, students and labors, and laws and governance were held account. In order to appease that social breakdown and to create a social harmony, grant holders intended to amend the existing programs, so the concept of free enterprise was emerged especially for spheres of education and vocational training. For the purpose of listening to demands of disadvantaged groups and sharing in production-oriented new world order, a social reform was focused and reorganization of public schools in compliance with the liberal system and competitive environment was seen as a cornerstone. All in all, "With education, it is aimed on one hand to raise a manpower what economy requires, on the other hand to gain consumer and producer behaviors as required by economic system" (Üstün, 2002).

There are many different ethnic backgrounds in United States and their quest for democracy, liberal economic order, and desire to adapt to the competitive world were all reflected on the education system. Charter school system was a result in the context of reform seeking. Albert Shanker was the second prominent name after Budde about this issue. According to the information given by UFT (United Federation of Teachers), Shanker presided at the American Federation of Teachers that had nine hundred seven members between the years of 1964-1986. He was at the fore in notable areas such as increasing the budget allocated for education, reducing classroom sizes and preparing more effective curriculum. In 1988, he brought up an alternative school idea which is autonomous, publicly funded and similar to private school system (Kahlenberg, 2008).

After Budde and Shanker, Citizens League Study Committee evolved the Charter School idea and published the proposal in 1988. Minnesota was the first state that imposed this reform in 1991 and deemed worthy of innovation award in 2000. Many states was legislated the regulation in 1990s and now a total of 40 states opened Charter Schools in United States (Kolderie, 2008).

The first Charter School was opened in Minnesota in 1991 and emerged as a result of reforms desired to be made in education. As first Charter School, it has been a pioneer to all country for the preparation to this system (Minnesota Session Law; 1991). By means of "No Children Left Behind (NCLB; 2002)" movement in 2001, Charter School system started to gain momentum. According to the Merriam-Webster dictionary, charter means "*a document issued by a government that gives rights to a person or group*". Recreating and dynamizing public schools were aimed. Modernization of education, keeping up with competition in all over the world, renewing itself continuously, increasing both quality and diversity and creating a system based on full performance were intended.

Opening a Charter School process starts when a group of teachers or educators comes together and applies to the local board of education. This authorized institution and applicants sign a contract with a logic of renting. According to most of states' Charter School laws and regulations, educational skills that students must gain in a determined time are specified in

initial contract and this contract renewed considering if contract articles are fulfilled when duration is finished (Minnesota Legislative Reference Library, 2014). There is a correspondence between Charter Schools and both public and private schools in terms of structure and management. Reasons, in parallel to private schools, are uncrowded classes, innovation goal, flexible curriculum, considering desires of trainees and performance-based system. The similarity between Charter and public schools is that they are both publicly funded. All people must have access to publicly funded schools and all applicants should have equal opportunity (Lubienski&Gulosino&Weitzel, 2009). Charter Schools are open to all segments of society regardless of race, gender, ethnicity, economic status and etc. In case of more applications than the capacity of these schools, a candidate pool is formed and random selection method is applied. One of the significant goals of Charter School reform is innovative curriculum and it is indented to actualize by performance-based accountability (Miron & Nelson, 2002). The purpose of a performance-based system is paving the way of innovations in education and setting higher goals by creating a competitive environment. But Gawlik (2012) put forward with his research that a system based on performance and accountability may have some disadvantages. Participants in Gawlik's research were teachers of Charter Schools. Those teachers stated that they put so much effort into implementing numerous educational strategies and creating project-based learning environments, detailed investigation on teacher and student performance created a pressure and this pressure affected their professionalism.

Charter Schools can vary because each state has different charter laws and each school has specific tasks and targets. Authorized entities in that school district monitor Charter Schools in terms of contract articles and contract is renewed after three to five years according to related state's charter laws and regulations (Chen, 2014). Charter Schools' structure is composed of attempting innovative methods that are undertaken in contract, less classroom sizes compared to public schools; focusing on different disciplines and having flexibility in trying new curriculums. In reference to Kamienski's (2011) research done in Chicago, students in public schools (adhere strictly to legal curriculum and obliged to comply with all regulations in state) and students in Charter schools (have flexibility in curriculum and performance-based system) were compared in terms of their SAT (Scholastic Aptitude Test) scores. It was seen that students in Charter Schools had higher SAT scores. Even though students in Charter schools are more successful in academic context because of innovation, having performance based system and accountability features, some variables are not considered such as motivation, support, economic resources, family processes and school employees and their possible contributions to success.

American education system is managed by U.S. Department of Education. According to U.S. Department of Education, the federal role in education is limited and educational policies are decided in local or state basis mostly. The reason for each Charter school gives emphasis on different areas and shows diversity in terms of organizational structures and management types. As Lee (2014) stated, how competitive market structure imposes an obligation to organizations about servicing better to customers and considering their demands, such an educational concept based on accountability and performance can be considered as a system that prioritize desires and needs of students and their families. Charter Schools are accountable for authorized government agencies, teachers, families and benefactors (Hill & Lake, 2004, s.3). The aforementioned government agencies are School Boards and School District where all educational institutes are registered to. These commissions deal with financial and managerial processes of all educational activities.

In Turkey, the responsible agency for education and training is Ministry of National Education. The national education system is organized by taking "*the Constitution of the Republic of Turkey, education related laws, development plans, national education councils and national programs as basis*" (Konan, 2002). The overall structure of educational system in our country is divided into two types as formal and non-formal education. Formal education comprises of preschool education, primary education, secondary education and higher education. Educational institutes expressed with public and private school terms are involved in National Education system, are structured by related ministry and included in formal education system. Educational environments and experiences in all schools are regulated according to criteria set by National Education Ministry. The current Private Education Institutes law was enacted on 08.02.2007 with the law number 5580. In common with public schools, curriculum and educational activities are tempered to principles of related ministry. "*The main framework of educational programs is determined by Ministry of National Education, in other words by an administrative centre. Each activity in schools should be involved in these educational programs. These activities comprise planning and programming of lesson plans, group meetings, and pedagogical activities, celebration of special days, excursion and observation activities, in service training activities, guidance services, leisure time activities, relations between school and environment*" (Nural, 2002). This monopolist attitude about educational programs has a negative effect on bringing light to different fields and development of individuals with different interests.

It is impossible to discriminate an educational system from other systems in a country. Educational system creates an inseparable whole with economic, political and social systems. In recent years, revisions have been made very often in Turkish education system. Having changes in many areas such as curriculum, names of courses, testing systems, school types, duration of compulsory education, schooling age etc. show that Turkish education system needs revisions in parallel to the improvements in other fields. The centralized structure of educational system in Turkey established an authority in many areas such as content of the curriculum, selection of course books, in-class activities, teaching methods and techniques, organization of classrooms, physical conditions of schools, uniform clothing in schools. "*The role of other institutions, local authorities, families and civil initiatives in education system are negligible*" (Al, 2013). In such a string of education system, individual features of students and requests of families can be ignored. Creating information society has become an indispensable goal of education in an age where globalization and technology culture diffuses everywhere. However, we are facing a problem whether or not education in Turkey is able to meet the essential qualities that each information literate individual must possess in an information society (Akyüz, 2013).

The purpose of this study is to ask opinions of faculty members in Educational Sciences department about the feasibility of Charter schools in Turkey. It was aimed to examine what kind of a position this innovative system might have in Turkish education system and what kind of results might be obtained from the charter model in current situation.

Method

Qualitative research design was used in this paper. According to Patton (1995), "Qualitative research is an effort to understand situations in their uniqueness as part of a particular context and the interactions there. This understanding is an end in itself, so that it is not attempting to predict what may happen in the future necessarily, but to understand the nature of that setting-what it means for participants to be in that setting, what their lives are

like, what's going on for them, what their meanings are, what the world looks like in that particular setting-and in the analysis to be able to communicate that faithfully to others who are interested in that setting. The analysis strives for depth of understanding" (cited by Meriam, 2013, p. 14). It was aimed to reveal opinions of participants about the overall structure of Charter Schools and possible effects in case this system is applied. Also, in accordance with the nature of qualitative research, purposeful sampling and criterion sampling techniques are used. The inspected sample must be a rich seam of information, this lies at the core of the criterion sampling. Thus, main deficiencies of the system can be revealed and it gives opportunities in order to develop the system or program (Patton, 2002). Faculty members of Educational Sciences departments were considered as a rich seam of information and their opinions were asked on a voluntary basis.

Semi-structured interview form was used as a tool for data collection in this research. Questions in the interview form were prepared by considering the related literature and Turkish education system, and views of experts put the last touches on the interview form. Information about organization and general structure of Charter schools were given to participants and they were asked to answer two questions. The first question was about the advantages and disadvantages of Charter schools compared to public and private schools when Turkish education system was considered as a reference. The second question was related to positive and negative sides of Charter School reform in case it was applied in Turkey.

Descriptive analysis, as one of the qualitative data analysis method was used in the analysis of the data obtained from semi-structured interview form. According to Yıldırım and Şimşek (2011), "*the aim in descriptive analysis is to submit the obtained data to readers in an organized and interpreted form. In descriptive analysis, direct quotations are allowed so often in order to reflect opinions of interviewed or observed individuals conspicuously*" (p. 224). The names of the 8 participants were not given and instead of this, figures like P1, P2, P3,… were assigned to them. NVivo 9 program was used in the arrangement and interpretation of the data.

Findings and Results

In this section, findings obtained from interview questions are presented.

The first question within the scope of this research was towards the advantages and disadvantages of Charter Schools compared to public and private schools according to the information given in interview form. The second question was addressing the participants' opinions about the feasibility of Charter schools in Turkey. Three themes were identified on the basis of questions on interview form and answers of participants. The first theme is advantages, second theme is disadvantages, third and the last theme is the feasibility of Charter Schools in Turkey.

1.Theme: The Advantages of Charter Schools

Participants declared that Charter school system is more advantageous compared to public and private schools. The emergent codes related to advantage theme are as follows:

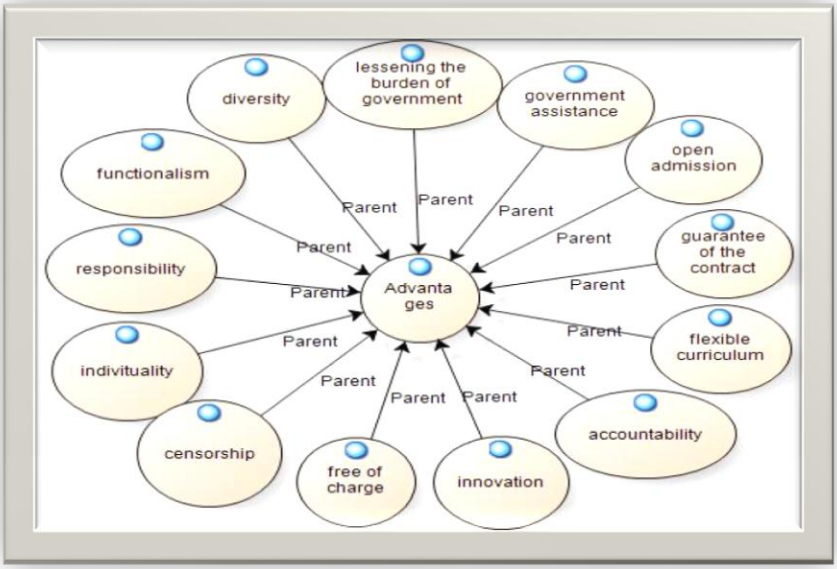

Figure 1: *Advantages of Charter Schools compared to Public and Private Schools*

Individuality, innovation, flexible curriculum, censorship, diversity, free of charge, accountability, responsibility, functionalism, open admission, government assistance, lessening the burden of government and guarantee of the contract are the advantages of Charter schools specified by participants. The following figure shows which items are used more often:

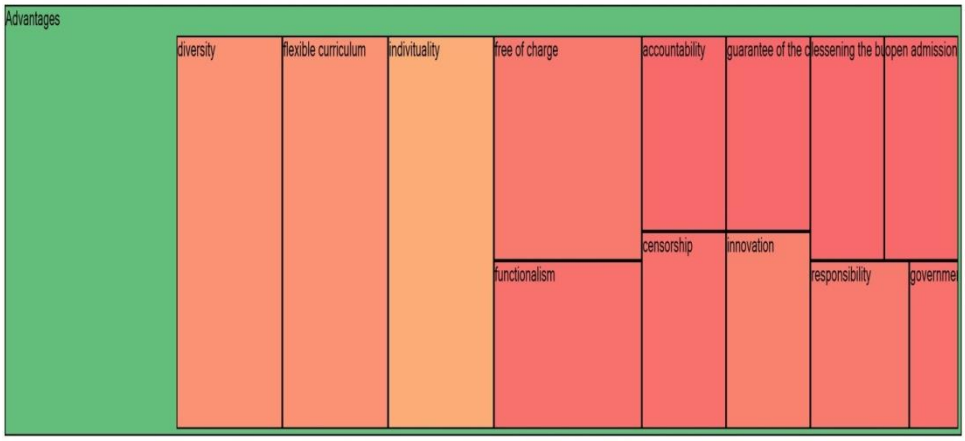

Figure 2: *The Prominent items about the advantages of Charter Schools*

In Turkey, private schools have a chance to diversify the curriculum and so they can give weight to ignored areas. Also, class sizes are lower compared to public schools and social services they serve are more extensive and varied. Charter schools are publicly funded and open to audition; from this aspect these schools are similar to public schools. In addition, Charter schools are similar to private schools in terms of its structure and management. Moreover, these schools are more flexible about curriculum and teaching methods and techniques compared to private schools in Turkey. All of these features are seen as advantages which make Charter schools different from public and private schools.

P2 stated the following with regard to advantages theme of Charter schools:

"While the curriculum of public schools is being updated once in five-ten years, Charter schools can update their curriculum annually. Flexible curriculum provides opportunity to select courses according to interests improve oneself in different areas. Features such as being open admission and free of charge increase the interest to these schools. Maybe, this is the most significant concept which makes these schools different from 'private school' statue. By abolishing the 'private-public' discrimination, education is perceived more positive in common. Moreover, it is important to lessen the burden of government. The fact that it is publicly funded and controlled by government gives the impression that the education is being guaranteed by the government. Signing a contract and controlling the obligations prevent the arbitrariness, so it allows perceiving the whole system as an 'open system'. Thus, the relationship between school and environment strengthens. Each individual has a chance to apply to open these schools. Thereby, helping qualified people to join society and paving the way for social development are provided. Being secular, in other words being independent from religions is so important in education. It is a very important development in our day due to prevent the influence of religious and dogmatic effects on the education. Through holding responsible students from their own success, the concept of 'individual education' comes into prominence instead of 'mass education'. The accountability of schools is expressed as 'governance'; this feature enables schools to be perceived more favorable and responsible by society".

Opinions of P3 about the advantages of Charter schools are as follows:

"Costs in private schools belong to the parents. The most outstanding advantage of Charter schools is they do not burden any costs to parents. Parents also have a chance to come together and apply to open such a school. This is very important in terms of accessing to education. Accountability is a positive thing from the standpoint of attaining the objectives of education. Also, contracting for a length of time is important in terms of sustainability of educational objectives".

The following are the opinions of P4 about the advantages of Charter schools:

"In terms of its purpose and functioning, Charter School is an alternative implementation which gives support to education. Controlling by government, being free of charge and being open to everyone even disadvantaged and different people, being free in customizing the education system are big advantages. Considering secularism in such environments prevents education to deviate from its purposes".

The following opinions belong to P6:

"Being a part of an education system which is designed according to the interests of students is so beneficial for both academic achievement and motivation. The present system does not address the student interests, so this problem causes students to concern just only for the grades, not for the content. This also causes to be insensible to school and education. In addition to this, because of economical and environmental conditions, many students do not have chance to go private schools. Some of these students feel themselves insufficient compared to ones who are in private schools. Charter school system is a big advantage for such students. A system can be created in which anyone makes class discrimination by this means".

Opinions of P7 about the advantages of Charter schools are as follows:

"A flexible curriculum yields to highlight individual differences and it becomes beneficial for individuals to develop themselves".

Based on the examples given above, it can be seen that participants agree on the subject of advantages of Charter schools. Some features as being free of charge, resembling to private schools in terms of structure but being publicly funded as public schools, being accountable and performance-based are seen as advantages of these schools and all these reveal the perception of competitiveness in education. Opinions of P1 about the advantages of Charter schools differ from other participants. P1 stated that:

"I lean towards every practice which lessons the burden of National Education system. Besides, such a reform does not have to be better or more advantageous in proportion to public schools. We should take a look at the functionality of this system. Even, we do not need to charge a mission about being secular on these schools. If we look at the examples in America, we can see that there are many successful schools which belong to religious congregations".

What makes P1 different from other participants is discussing charter system as an alternative novelty which lessens the burden of public schools. This participant approaches to charter system within the framework of accumulation of problems in education system and difficulties in management of it. So, P1 leans toward such a system which has an ability to remove this increasing load day by day. In this context, it does not matter whether or not a secular stance these schools hold. P1 considered that a variety of religious congregations can open Charter schools as long as they lessen the burden of National Education and increase the success.

2.Theme: Disadvantages of Charter Schools

Findings related to disadvantages of Charter schools are as follows:

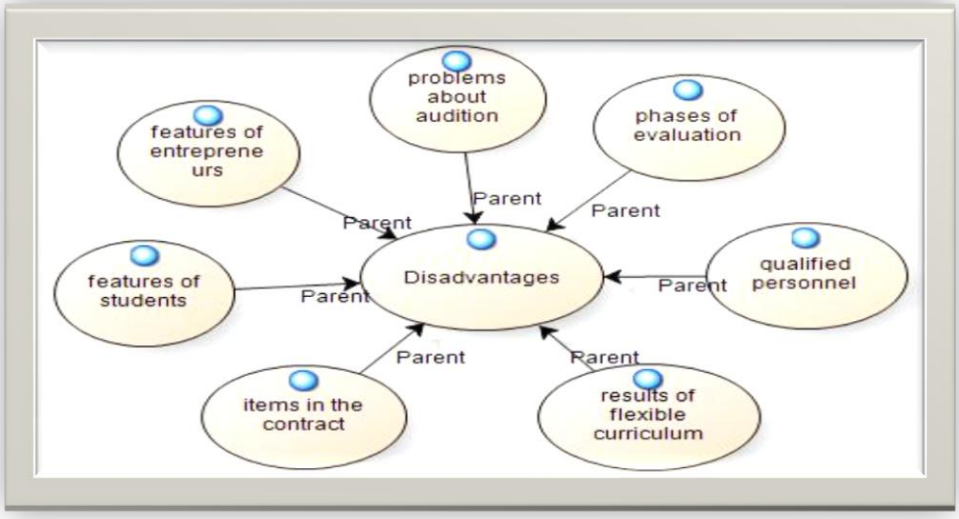

Figure 3: *Disadvantages of Charter Schools compared to public and private schools*

Problems are led by flexible curriculum, gathering students with different characteristic because of open admission, unable to set criteria and process about evaluation, unable to know the characteristics of entrepreneurs, inexplicit items in contract, lack of confidence about audition process, lack of qualified personnel are the emerging findings in the matter of

disadvantages of Charter schools. The following figure shows which items are used more often:

Figure 4: *The Prominent items about the disadvantages of Charter Schools*

What P4 said about the disadvantages are as follows:

"The flexibility in designing curriculum raises the issue of violation the principle of equal opportunity in those schools".

Opinions of P6 about the disadvantages of Charter schools are as follows:

"If there weren't enough Charter schools and even so excess demand, in other words if supply and demand equilibrium were not provided, only draught students would be able to benefit from this service. This will cause class discrimination and damage the principle of equity in education".

P7 expressed the followings about the disadvantages:

"That kind of education system may cause to meet some problems about not possessing main features that the job market requires in employment".

Ideas of P3 are as follows:

"Opening and managing a school requires particular knowledge and skills. If non-educators are allowed to open schools, this may lead to encounter major problems".

What P8 said about the disadvantages of Charter schools compared to public and private schools are as follows:

"These practices do not seem useful in order to create professionalism, happier and more productive individuals. Charter school system seems as a product of global market oriented scenario. Actually, this system ignores personal growth and personal qualities; it only aims to train appropriate personnel for business world".

P2 said that:

"Audition is the most important part of this process. In the absence of a sufficient control mechanism, these schools become invalid. What kind of sanction will be exposed to ones who

disregard the contract items is unclear, entrepreneurs will be affected negatively. Finding qualified personnel is difficult, a mismatch between objectives and results can occur. Unless school entrance exams are not made, students may choose schools which are not suitable for them. This makes things difficult for both students and teachers. Drawing system may be objected and prioritizing student capabilities or using different criteria can be requested. Debates about whether or not students in those schools are committed to national values and state may appear. In case of disagreement between stakeholders, the school is adversely affected as a whole. Also, flexible curriculum requires flexible implications. Being open to performance and different methods increases the cost. This may damage the economy system of the state or the donator matter may lead to deform the charter system".

3.Theme: The Feasibility of Charter Schools in Turkey

Participants are asked about the feasibility of Charter schools in Turkey. In general, they emphasized the following topics: Turkish education system is not ready for such a reform, problems in education system cannot be solved by this way, there are strong opponents who will not accept such a reform, there may be some opportunist who will try to use this system to obtain commercial profit and there may be some troubles because of the problems in controlling mechanism in Turkey.

Thoughts of P1 about this question are as follows:

"In Turkey, some people are always opponent to any change in education system. They will oppose to this issue as well. They will think such a reform is a privatization and also say benefits of education are made available to someone who supports the government. They will reflect this reform as a regime crisis. Some will find this system contrary to the Law on Unification of Education. Apart from these, there will be people who will adopt this system. But many of them will seek ways how to benefit from charter system, how to open a space for themselves, how to convert this reform to money".

The following are the opinions of P4 about the feasibility of Charter schools in Turkey:

"If we consider the implications about education in Turkey, we can see that Charter school system could not be able to meet the standards as it did in other countries. It can be seen that control mechanism plays a functional role in the establishment and survivability of these schools. Whereas many researches verified that control system in Turkey has many problems. Combination of deficiencies in curriculum and weak control system may lead to encounter some major problems. Also, entrepreneurs may consider this situation as a commercial gain".

The opinions of P3 are as follows:

"Opening and managing a school and maintain educational activities require particular knowledge and skills. If such entrepreneurs attempt to open these schools, of course this system can be applicable in Turkey. But when we regard Turkey and its circumstances, we can easily see that no consensus can be built on certain basic principles and philosophical basis. So, opening these schools can be viewed prejudicially".

Following are the opinions of P2 towards the feasibility of Charter schools in Turkey:

"It is difficult to find donators and entrepreneurs in Turkey. It is possible to see problems

between stakeholders. Also, I believe that secular education is not possible in Turkey because even people say education is secular; Religious Culture and Moral Knowledge course is still a required course. There may be problems about people who will make the controls about those schools. Education is mostly hold down by public sector, so it is possible that the government may not want to leave this sector to private corporations. Adhering to an agreement is another big problem in our country. Because termination, renewal and sanctions in our laws are not suitable to European standards, we may suffer from some negativity. Also, schools may suffer due to need of domain experts".

Here are the opinions of P8:

"There are problems originating from the existing system without exception of public or private school in Turkey. Such reforms do not solve the problem. Our education system is falling victim to daily superficial politics. Charter system is not applicable because of centralized and authoritarian management of Turkey. However, it may be suitable for pre-school education. When we look at the past, Conservatory Secondary Schools got a poor response and they are renamed as Fine Arts High schools. What is more, they can be counted on the fingers of one hand. Also, outnumbering Vocational High Schools are even not functional. As a result, Turkey is not ready yet for more liberal applications".

Majority of the participants expressed that being publicly funded, guarantee of government, flexible curriculum, accountability and responsibility are great advantages of Charter schools. But they said that the system provides benefits in other countries, but this does not mean that it will do the same in Turkey. So all of them foresaw Turkey is not ready yet for such reforms.

Discussion and Suggestions

This study focused on the notion of Charter Schools and its feasibility in Turkish educational context. According to the views of the participants, there are pros and cons about the application of Charter Schools in Turkey. Al (2004) did a research about charter system and its usability in other areas because charter method in United States took place in educational services as a quest for governance. Although this reform was supported by opposite political poles for a long time, after private sector participated in the management of these schools, adverse opinions were emerged. This reform was made in order to provide equality in education, but the belief that these schools could expand the discrimination increased day by day. Despite these adversities, Al expressed positive opinions about Charter school system in terms of democratization, joining new actors in education, developing and using new methods, leading to change in public schools and eliminating the public school-private school dichotomy.

In another study of Al (2013), he expressed that doing changes perpetually in Turkey meant that an innovative reform was needed. He mentioned that charter model had some originality, because it gave freedom to students to choose publicly owned schools and its hybrid structure which was constructed by the elimination of public school-private school dichotomy. But in case of using this model in Turkey, he stated that discrimination based on gender, ethnicity, native language and socioeconomic status can be increased further. But he also articulated that all these problems can be overcome and resolved by a detailed and well functioning control mechanism.

Within the scope of participants' answers, Charter schools seem more advantageous compared to public and private schools. Despite the advantages dominated the disadvantages,

participant do not look positively to the feasibility of Charter school system in Turkey. They argue that the current system prevents such innovations. Even though this model is available in United States and in different countries and brings success, it is necessary to evaluate Turkey in its authentic context that takes shape by its history, unsteady periods, political developments, geopolitical position, economy and social structure. In this context, negative opinions are expressed by far on the issue of feasibility of charter model.

Surely, this model can bring dynamism to education by competition servicing like a private school but being publicly funded. But in a system where control mechanism has problems, alternative and liberal methods like Charter schools can do more harm than good. Sustainable education is precluded because of policies which are altered in each government period. Unstable policies will cause difficulties in terms of implementation, management, controlling and taking sanitary feedback. Whereas employment guarantee for future has not provided yet for any scholars at universities, an initiative which aims to train staff for competitive market according to current conjuncture of the country will cause problems. It is essential to have a detailed, strict and objective control mechanism because of the criticism about privatization of education. All in all, it can stated that Charter school reform can be applicable in Turkey under well functioning control mechanism.

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Examination of the Problem Solving Skills of University Students in Albania and Turkey in Terms of Various Variables

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Researching the problem solving abilities of the college students in Albania and Turkey by various variances is the general purpose of this research. Within the frame of this general purpose, "are the sub-dimensions of the problem solving inventory of the students of Epoka University of Albania and Selcuk University of Turkey differentiating and according to variances of gender, age and university department?" were researhed. 526 randomly selected undergraduates from the Business, International Relations, Computer Engineering and Civil Engineering departments of the Epoka and Selcuk Universities constituted the sample of the study. Epoka University of Albania was added to the research population with Selcuk University of Turkey because of the fact that the students of it were graduated from Turkish High Schools and they could talk, understand, read and write in Turkish language. The "Problem Solving Inventory" adapted to Turkish by Sahin, Sahin and Heppner (1993) was used in the collection of data. In the study it was determined that the students of Epoka University exhibit more positive problem solving approaches in terms of impatient, avoidant and self-confident approaches than the students attending to Selcuk University. It was also determined that the total problem solving inventory points of the students of the both universities did not differentiate in terms of gender and the departments they attend to, but exhibited a significant difference in terms of the variable of age.

Introduction

We encounter a set of problems in the communal living. Problem is a status which comes onto and blocks one's way (Adair, 2000); it is the difficulties that come onto one's current strengths of a desired aim of one (Bingham, 2004). As for problem solving, it is defined as choosing from various effective and beneficial tool and behaviour possibilities for the desired aim and using it (Demirel, 1993); as an entirety of phases which one determines

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and evaluates many action alternates and applies the chosen action (Deniz, 2004); as a term which requires series of efforts for resolve the encountered hardships for the desired aim (Bingham, 2004). Anderson (1980) defined the problem solving as directing the cognitive processes to an aim in sequence (Cited by Kaptan and Korkmaz, 2002). According to Demirtaş and Dönmez (2008), problem solving is a complex term which one experiences starting from feeling of the problem and ending at the solution in which cognitive abilities have affective and behavioural aspects.

Problems can be a difficulty which requires a basic choice to be made, but they can also be a problem which includes much more complex situations and affects the human life negatively when unsolved (Arslan, 2005). One, who encounters with a problem, gets into series of efforts to resolve the problem. As a result of these efforts, if one resolves the problems successfully, one feels good emotionally and can learn how to resolve problems practically. As for one who cannot resolve problems successfully, one has emotional problems as a result of the hardships of the problem and has lower ego perception. Taylan (1990) stated that the ones who cannot effectively resolve the problems, have more emotional problems than others and cannot resolve the problems without getting helped; are more insatiable and has less ego perception than others; have hard time understanding expectations and intentions of others and are more worried, anxious, insecure and over sensitive than others. The ones who can resolve their problems effectively have positive problem solving self-evaluations. Other than that the ones who evaluate their problem solving ability positively, can resolve their problems effectively (Ferah, 2000).

Solution of the problems varies depending on the problem type and complexity. In order to solve this complex and various problems, one does benefit from different information sources (Cüceloğlu, 2004). Generally, these are previous applications, authority figures, the experience of one and science. Science provides that the problem solving is based on general, credible and most effective data of humans. One may consult one or more of these four aspects (Karasar, 2009). Demirel (1993) states that the problem solving is a scientific term for transforming the given status into a status with aim.

There are many factors affecting the problem solving term. Self-confidence, experiences and past life, emotions and thoughts, mother and father manners can be counted as these factors.

Self-Confidence: Problem solving and self-confidence is in a cyclic relation. The children with high self-confidence learn to identify the problems they encounter, to find various ways for resolving it, to attempt to resolve it always and to not run away from problems by shouldering their responsibilities better (Bingham, 2004). Ones with effective problem solving abilities have improved self-confidence; and as a result they use active planning in their problem solving (Yazıcı, 2001).

Past Life and Experiences: Having many problems in one's past only helps one to have resolving ways for these problems to come. If a problem one encountered has been encountered by one in the past, the solution performed in the past experiences is performed. If the problem has experienced for the first time by one, one tries to produce a new solution way. The more kinds of problems one experiences, the less time one needs to find a solution way. Ones who has a rich experiencing opportunity in ones' childhoods, who has been made encounter various problems consciously and who has got positive reinforces improve positive attitude for problem solving. This situation increases their problem solving success (Kasap, 1997).

Emotions and Thoughts: Expressing one's emotions in a right way has an important role for problem solving. Ones who cannot express their feelings get angry quickly. Ones who cannot control their angers can put themselves in more complex situations in problem solving. Öğülmüş (2001) states that one feels anxiety, fear, sadness, anger or frustration before solving a problem and happiness, pride or relief after solving a problem. Also the way of thinking on the problem is very important in the

problem solving term. While thoughts such as "This is very hard", "If I had more potential" harden the problem solving term, thoughts like "Problems might just get solved in a moment", "Winning f a party does not mean the losing of another party" ease the problem solving term.

Parents' Attitude: According to Thornton (1998), children and teenagers expect help from their parents for solving more complex problems. This help is the preparation of the necessary environment for them to resolve the problem; yet this environment must not be interfered with (Cited by: Demirci Danışık, 2005). In a research done with the college students, it was seen that the problem solving abilities of the students who perceive their mother and father as democratic is higher than the ones who who perceive their mother and father as authoritarians (Kılıç Basmacı, 1998). According to Gordon (1999), the attitude of "no losing" named as "effective listening" used in the solution of the problems, teaches the parents to easily encourage their children for resolving their problems by themselves (Cited by: Aydın, 2009). When effective listening is combined with empathetic understanding, the children feel valued and this might help them to resolve their problems by themselves. If parents or the adults in the environment of the children effectively listen empathetically the children, the children may solve their problems themselves (Whirter and Acar, 2000).

In order to solve the problems effectively, the "creative thinking" is also necessary (Yıldız, 2003). Creative thinking plays an important role for resolving the obstacles by thinking the solution term phases in a certain system especially for complex problems.

In the college years, the students face many problems economically, socially and psychologically. Mostly, they try to solve their problems based in their past experiences. Some of the students perceive themselves as successful in problem solving and some other as failure in it. Heppner and Petersen (1982) found out in their research done on the college students that the students who perceive themselves as "successful" show more effort than the ones who perceive themselves as "failure" in problem solving; they can perceive the problem solving term; they do not feel anxiety while facing with the problem; they can understand the problems easier; they have more effective problem solving abilities and their social ability fields are wider.

Perceiving themselves as sufficient against the problems they face will allow college students to take successful decision in the important decisions on their future. In the research of Deniz (2004) in which he researched the relation between self-esteem in deciding, deciding styles and problem solving abilities of college students, significant relations between self-esteem in deciding, postpone, careful, panicked, avoider deciding in deciding styles and problem solving inventory sub-dimensions and their total points.

Literature Review

Various theories and methods were developed on problem solving. Some of these are stated below:

John Dewey's Projective Thinking Theory: Dewey (1933) emphasizes that the schools should not only provide information to the students, but also the habit and strength of coping with new problems (Cited by: Hesapcıoğlu, 1998). Dewey's problem solving method includes five steps. These are: 1st Noticing the hardship and defining the problem, 2nd Obtaining the necessary information and classifying, 3rd Creating the suitable hypothesis, 4th Testing the possible solutions, 5th Confirming the results and evaluating them. Dewey also states that these steps are not unchangeable and do not have to follow a certain sequence. Also, according to Dewey, these phases can be widened, new phases can be developed and some of them can be taken out or shortened (Cited by: Çağlayan Dinçer, 1995).

Karl Popper and Problem Solving: Popper (1972) states that the science has started with problems not with observation. Popper approaches and defines problem solving as a philosophy. In order to be deemed to understand the problem, one has to perceive a part of the problem, meet its sub-dimensions and understand the logical pattern between them. According to this theory, one can understand a

scientific problem by living it, trying to solving it and failing to solve it. The first thing to do to understand the problem is "finding the hardship" (Cited by: Saygılı, 2000).

Alex Osborn's Problem Solving Theory: According to Osborn, the creative problem solving term consists of three phases. These are "Finding problem", "finding thought" and "finding solution". Problem finding requires definition and preparation of the problem. Defining the problem includes taking the problem from a complex structure; preparing the problem includes collecting the necessary data and analysing processes. Finding thought includes producing thoughts and developing them. Producing thoughts means producing as much as thoughts. Developing thoughts means adding the surfaced thoughts together and processing them again and choosing the suitable one. Finding thought phase is accepted as "hypothesis developing" phase. Finding solution consists of evaluation and choosing phases. Evaluation is the testing of various solutions or checking them in any other way. Choosing – Accepting the choice – phase includes comparing a thought with others and attaching it to the resolution (Cited by: Sungur, 1992).

Guilford's Creative Problem Solving Model: Guilford problem solving behaviour is stated to start with inputs both from the environment and the body of one (Cited by: Altuntaş, 2008). In his model, there are four necessary variances especially for creative term. These are: screen, memory, convergent and divergent production. The problems seen in any of these variances prevent the problem solving (Çağlayan Dinçer, 1995).

Mountrose and Five Phase Problem Solving Method: Mountrose (2000) suggests a five phase method which includes the emotions in the problem solving term. Mountrose states that the adults refer to the classic problem solving method known as "don't do this, do that" and emphasizes in the change of the behaviour, the emotion and thoughts under the behaviour must be manifested. The phases of this method which also include better communication with the children are; 1st Defining the problem, 2nd Expressing the emotions, 3rd Finding the negative belief, 4th Finding the positive belief, 5th Animating the future in mind.

In sum, the common phases of various approaches or various researchers' problem solving terms are; realizing and defining the problem, analysing the problem, developing alternate resolutions, performing the chosen resolution and evaluation of the result (Yıldız, 2003). According to Bingham (2004), even if problem solving behaviour differs according to problem and individual, the problem solving processes have some general and basic aspects. These are, recognizing the problem and feeling the urge of dealing with it, identifying the field of the problem for describing it and trying to comprehend the secondary problems related with it, collecting the necessary data and information related with the problem, choosing and regulating the most suitable data for the problem, confirming the possible solution ways under the light of collected data and information, evaluating the solution ways and choosing the most suitable solution, performing the decided resolution, evaluating the performed problem solving method at the end. These are general approach, defining the problem, creating choices, deciding and evaluating.

Purpose

Researching the problem solving abilities of the college students in Albania and Turkey by various differences is the general purpose of this research. Within the frame of this general purpose, the sub-problems stated below were developed:

(1) Are the sub-dimensions of the problem solving inventory (hasty, thoughtful, avoiding, self-confident, evaluating and planned approaches) of the students of Epoka University of Albania and Selcuk University of Turkey differentiating?
(2) Are the problem solving inventory points of the students of Epoka University of Albania and Selcuk University of Turkey differentiating according to differences of gender, age and university department?

Methodology

The survey method was used in the research. Survey models are research approaches which purposes to describe a situation of past or a situation still exists as it existed (Karasar, 2009). The problem solving abilities of the students of Epoka University of Albania and Selcuk University of Turkey were researched in this study.

Population and Sample

The population of the research are the students of Epoka University of Albania and Selcuk University of Turkey. Epoka University of Albania was added to the research population with Selcuk University of Turkey because of the fact that the students of it were graduated from Turkish High Schools and they could talk, understand, read and write in Turkish language.

The research population consists of the students of Architecture – Engineering Faculties and Economic and Administration Sciences Faculties of 2009 – 2010 education year of Epoka University and Selcuk University. The Architecture Department of Architecture – Engineering Faculty of Selcuk University has 346 students; the Computer Engineering Department of Architecture – Engineering Faculty of Selcuk University has 216 students; the Business Administration Department of Economic and Administration Sciences Faculty of Selcuk University has 686 students; International Relations Department of Economic and Administration Sciences Faculty of Selcuk University has 586 students; in total of 1834 students. The Architecture Department of Architecture – Engineering Faculty of Epoka University has 61 students; the Computer Engineering Department of Architecture – Engineering Faculty of Epoka University has 92 students; the Business Administration Department of Economic and Administration Sciences Faculty of Epoka University has 126 students; International Relations Department of Economic and Administration Sciences Faculty of Epoka University has 78 students; in total of 348 students.

A sample group of 526 students was created by basic coincidental method from the research population. 268 students of the sample group (51%) were students of Selcuk University; 258 students of the sample group (49%) were students of Epoka University. Selcuk University students of sample group had 140 (52,2%) female; 128 (47,8%) male students; Epoka University students of sample group had 133 (51,6%) female; 125 (48,4%) male students. Selcuk University students of sample group had 55 (20,5%) Architecture students; 80 (29,9%) Computer Engineering students; 75 (28,0%) Business Administration students; 58 (21,6%) International Relations students; Epoka University students of sample group had 56 (21,7%) Architecture students; 88 (34,1%) Computer Engineering students; 74 (28,7%) Business Administration students; 40 (15,5%) International Relations students.

Data Collection Tools

In the research, "Problem Solving Inventory" (PSI) for determining the problem solving abilities and "Personal Information Form" (PIF) for determining the demographic aspects were used.

Problem Solving Inventory (PSI): Inventory was developed by Heppner and Petersen (1982) and adapted to Turkish language by Sahin, Sahin and Heppner (1993). It is a measure which measures the individual's self-perception in problem solving abilities. This measure can be applied to teenagers and adults and it consists of 35 articles pointed with 1-6 points in Likert scale. The highest point can be obtained from the inventory is 192 and the lowest is 32. Higher points mean that the individual has perceives himself/herself as insufficient on problem solving abilities; lower points mean that the individual has perceives himself/herself as sufficient on problem solving abilities. The Cronbach Alpha credibility coefficient is found as .88. The credibility coefficient obtained with dividing in half is found as r = .81. As a result

of performed factor analysis, Six sub-dimensions of "Hasty approach" (13th, 14th, 15th, 17th, 21st, 25th, 26th, 30th and 32nd articles, α = 0.78), "Thoughtful Approach" (18th, 20th, 31st, 33rd and 35th articles, α = 0.76), "Avoiding Approach" (1st, 2nd, 3rd and 4th articles, α = 0.74), "Evaluating Approach" (6th, 7th and 8th articles, α = 0.69), "Self-Confident Approach" (5th, 23rd, 24th, 27th, 28th and 34th articles, α = 0.64), "Planned Approach" (10th, 12th, 16th and 19th articles, α = 0.59) were found.

Personal Information Form: A "Personal Information Form" consisting of 4 articles for determining the properties of the sample was created by the researcher based on the literature and also with an expert opinion. Form was consisting of university, department, age and gender information of the participating students.

Data Collection and Analysis

Cooperation with academicians of the stated departments of Selcuk University and Epoka University was performed for data collection. "Personal Information Form" and "Problem Solving Inventory" were applied together and the application took approximately 20 – 25 minutes.

Each measure was examined and 44 measures were counted as invalid because they were filled faulty or deficit or they were null; therefore 526 measures was taken into evaluation. The collected data was entered into SPSS for WINDOWS 13.0 package software and statistical analyses were done. For the analysis of the research data, independent sample t-test, two factor Variance analysis (ANOVA) techniques were used. As a result of variance analysis, in case a significant difference were to be found between the group averages, Tukey test was to be used for determining the groups of the difference. P<.05 significance level was taken as a standard for interpreting the difference as significant or insignificant.

Findings

In this part, problem solving inventory sub-dimension points of the students of Epoka University in Albania and Selcuk University in Turkey, and their problem-solving inventory total points according to gender, age and field of education variables in line with the sub-probs.

1. Findings concerning if ***problem solving inventory sub-dimension points of the students of Epoka University in Albania and Selcuk University in Turkey change or not*** *(hasty, thinking, avoider, self-confident, evaluator and planned approach):*

Independent sample T test results of the students of Epoka and Selcuk University related to problem solving inventory sub-dimension points are shown in Table 1.

Table 1. Independent sample T test results of the students of Epoka and Selcuk University related to problem solving inventory (PSI) sub-dimension points

PSI Sub-Dimension	University	N	$\overline{X}$	Ss	T	p
Hasty Approach	Selcuk Epoka	268 258	33,10 25,56	7,30 7,86	11,40	.000*
Thinking Approach	Selcuk Epoka	268 258	13,21 13,58	4,12 4,76	.941	.347

Avoider Approach	Selcuk Epoka	268 258	16,79 10,03	4,26 4,93	16,83	.000*
Evaluator Approach	Selcuk Epoka	268 258	7,60 7,77	2,78 3,64	.591	.555
Self-Confident Approach	Selcuk Epoka	268 258	20,90 18,88	4,24 6,28	4,32	.000*
Planned Approach	Selcuk Epoka	268 258	10,25 10,72	3,28 4,00	1,47	.143

**p<.05*

As seen in Table 1, it has been found that there are significant differences between averages in terms of hasty approach, avoider approach and self-confident approach which are among the problem solving inventory sub-dimensions of the students of Epoka and Selcuk University. No significant difference has been found among the arithmetic between in the other sub-dimensions.

When we look at the point averages of hasty approach, avoider approach and self-confident approach, it is seen that the students of Epoka University have lower point averages than the students of Selcuk University. Low points obtained from Problem Solving Inventory shows that the individual shows a more positive approach against a problem. The students studying in Epoka University show more positive problem solving approach against problems than the students of Selcuk University.

2. ***Findings concerning if problem solving inventory sub-dimension total points of the students of Epoka University in Albania and Selcuk University in Turkey, changes according to gender, age and field of education variables or not:***

Findings concerning problem solving inventory total points of the students of Epoka University and Selcuk University, changes according to gender, age and field of education variables are given in separate tables. Descriptive statistics related to problem solving inventory total points of the students of Epoka University and Selcuk University in terms of gender variable are shown in Table 2.

Table 2. Descriptive statistics related to problem solving inventory total points of the students in terms of gender variable.

University	Gender	N	$\overline{X}$	Ss
Selcuk	Female	140	113,54	14,33
	Male	128	111,09	13,92
	Total	268	112,37	14,17
Epoka	Female	132	93,48	22,99
	Male	126	96,06	24,34
	Total	258	94,74	23,65
Total	Female	272	103,80	21,49
	Male	254	103,63	21,14
	Total	526	103,72	21,30

When Table 2 is analyzed, it is seen that arithmetic point averages of the females studying in Selcuk University is (113,54); arithmetic point averages of the males is (111,09). It is seen that arithmetic point averages of the females studying in Epoka University is (93,48); arithmetic point averages of the males is (96,06). To detect if there is a significant difference between these arithmetic points averages or not, two-factor ANOVA analyze has been carried out and the results are shown in Table 3.

Table 3. Two-factor ANOVA results concerning problem solving inventory total points of the students of Epoka University and Selcuk University in terms of "university and gender".

Source of Variance	Squares Total	sd	Average of Squares	F	p
University	40392,67	1	40392,67	107,32	.000*
Gender	,611	1	.611	.002	.968
University x Gender	832,40	1	832,40	2,21	.138
Error	196467,30	522	376,37		
Total	5896817,00	526			

*$p<.05$

When Table 3 is analysed, it is found that, "university x gender" common effect isn't significant as a result of two-factor ANOVA analysis applied to problem solving inventory total points according to university and gender variable ($F_{(1-522)}=2,21$, $p>.05$). In other words, problem solving skills of the university students in terms of gender variable don't show significant differences according to university.

Descriptive statistics concerning the problem solving inventory total points of the students of Epoka University and Selcuk University in terms of age variable are shown in Table 4.

Table 4. Descriptive statistics concerning the problem solving inventory total points in terms of age variable.

University	Age	N	$\overline{X}$	Ss
Selcuk	17-19	24	114,00	17,55
	20-22	155	112,03	13,48
	23-25	89	112,52	14,47
	Total	268	112,37	14,17
Epoka	17-19	66	91,23	25,75
	20-22	161	97,73	21,85
	23-25	31	86,71	25,80
	Total	258	94,74	23,65
Total	17-19	90	97,30	25,82
	20-22	316	104,74	19,56
	23-25	120	105,85	21,24
	Total	526	103,72	21,30

As seen in Table 4, it is understood that arithmetic point averages of 17-19 ages students studying in Selcuk University is (114,00); of 20-22 ages is (112,03); of 23-25 ages is (112,52); arithmetic point averages of 17-19 ages students studying in Epoka University is (91,23); of 20-22 ages is (97,73); of 23-25 ages is (86,71). Two-factor ANOVA analysis are carried out in order to detect if there is a significant difference between these arithmetic point averages and the results are shown in Table 5.

Tablo 5. Two-factor ANOVA results concerning problem solving inventory total points of the students of Epoka and Selcuk university in terms of "university and age" variable.

Source of Variance	Squares Total	sd	Averages of Squares	F	P
University	34996,85	1	34996,85	94,31	.000*
Age	2042,47	2	1021,24	2,75	.065
University x Age	2877,02	2	1438,51	3,88	.021*
Error	192966,07	520	371,09		
Total	5896817,00	526			

*$p<.05$

When we look at Table 5, it has been found that "university x age" common effect is significant as a result of two-factor ANOVA analysis applied to problem solving inventory total points according to university and age variable ($F_{(2-520)}$=3,88, p<.05). In other words, problem solving skills of the university students in terms of age variable show significant differences according to the university they study. Tukey test is applied in order to detect which age groups are the reason for this difference and the results are shown in Table 6.

Table 6. Tukey tests results carried out in order to detect between which age groups problem solving skills of Epoka and Selcuk university show difference.

Age	17-19	20-22	23-25
17-19	$\overline{X}$ =97,30		
20-22	p<.05	$\overline{X}$ =104,74	
23-25	p<.05	-	$\overline{X}$ =105,85

According to Tukey test results given in Table 6, a significant difference at a level of p<.05 related to problem solving skills has been found between 17-19 age group's students and 20-22, 23-25 age groups' students. It is seen that this difference is in favour of 20-22 ($\overline{X}$ =104,74) and 23-25 ($\overline{X}$ =105,85) age groups' students. So, problem solving skills of individuals increase while the age is increasing.

Descriptive statistics concerning problem solving inventory total points of the students of Epoka and Selcuk University in terms of field of study variable is given in Table 7.

Table 7. Descriptive statistics concerning problem solving inventory total points in terms of field of study variable.

University	Field of Study	N	$\overline{X}$	Ss
Selcuk	Architecture	57	112,14	13,26
	Computer Engineering	80	111,44	13,48
	Business Administration	72	114,39	14,79
	International Relations	59	111,38	15,22
	Total	268	112,37	14,17
Epoka	Architecture	64	97,72	21,71
	Computer Engineering	78	96,79	22,85
	Business Administration	65	89,97	25,09
	International Relations	51	93,94	24,96
	Total	258	94,74	23,65
Total	Architecture	121	104,51	19,53
	Computer Engineering	158	104,21	20,04
	Business Administration	137	102,80	23,67
	International Relations	110	103,29	22,03
	Total	526	103,72	21,30

When Table 7 is analysed, in Selcuk University: it is seen that arithmetic point averages of Architecture students are (112,14); arithmetic point averages of Computer Engineering students are (111,44); arithmetic point averages of Business Administration students are (114,39); arithmetic point averages of International Relations students are (111,38). In Epoka University: it is seen that arithmetic point averages of Architecture students are (97,72); arithmetic point averages of Computer Engineering students are (96,79); arithmetic point averages of Business Administration students are (89,97); arithmetic point averages of International Relations students are (93,94). Two-factor ANOVA analyse has been carried out in order to detect if there is a significant difference between these arithmetic point averages and the results are given in Table 8.

Table 8. Two-factor ANOVA results concerning problem solving inventory total points of the students of Epoka and Selcuk university in terms of "university and field" variable.

Source of Variance	Squares Total	sd	Average of Squares	F	p
University	40452,27	1	40452,27	107,75	.000*
Field	622,59	3	207,53	.55	.646
University x Field	2237,60	3	745,87	1,99	.115
Error	194465,89	518	375,42		
Total	5896817,00	526			

**p<.05*

When Table 8 is analysed, it is found that "university x field" common effect is not significant as a result of two-factor ANOVA analyse applied to problem solving inventory total points according to university and field variable ($F_{(3-518)}$=1,99, p>.05). In other words, problem solving skills of the university students in terms of field variable show no significant difference according to the university they study.

Conclusions

According to the research findings, it has been found that, among the problem solving inventory sub-dimensions, there are significant differences between the hasty approach, avoider approach and self-confident approach point averages of the students of Epoka and Selcuk University; there is no significant difference between the point averages of thinking approach, evaluator approach and planned approach. It has been seen that students of Epoka University have more positive problem solving skills than the students of Selcuk University in terms of hasty approach, avoider approach and self-confident approach. It can be said that the difference between the problem solving skills of the students of Epoka and Selcuk University results from the cultural differences between the two countries. According to Kağıtçıbaşı (1990), family and community life are effective in Turkish culture: "dependency" functions as a desired feature rather than individualism and independency. Likaj (2008) says that Turkish youth cares about communal norms so much and their relation with their families are so close; but Albanian youth cares about the values that show individualism mostly. It is thought that the fact that the students of Selcuk University tend to dependant life more is a factor that affects their problem solving skills. In addition, it is thought that this difference is also related to socio-economic level. Since there are studies (Kasap, 1997; Bilge and Arslan, 2000; Terzi, 2003) showing that problem solving skills of the individuals increase while the socio-economic level rises. Also in the study of Kasap (1997), it has been found that the students whose socio-economic level is high improve a more positive problem solving approach. In the study of Terzi (2003), interpersonal problem solving skills of the students with high socio-economic level are higher than the students with low or medium socio-economic levels. In addition, Bilge and Arslan (2000) found that problem solving skills of the university students have been evaluated more positively as the monthly income of their family rises. In his study Likaj (2008), found that there is a small difference between the socio-economic levels of the families of Albanian and Turkish youth and this situation is in favour of Albanian youth. If it is thought that the socio-economic situation of the students of Epoka University is higher than the students of Selcuk University, this case can be evaluated as a factor affecting the problem solving skill positively. Education level of family is also evaluated as another factor effecting problem solving skill of the individual. In the study of Saygılı (2000), significant relationship between the education levels of parents and problem solving skill perception of the students is observed. In a study of Eroğlu (2001), the result that education levels of parents are effective for students to obtain skills and habits that improve their problem solving skills has been

obtained. In his study Likaj (2008), found that generally Turkish parents are primary school, secondary school and high-school graduates while Albanian parents are high-school, university graduate or postgraduates. When all of these are taken into account, it can be said that socio-economic level, education level of family and cultural differences are effective in the situation that the students of Epoka University show more positive problem solving approach than the students of Selcuk University in terms of hasty, avoider and self-confident approach.

When the findings are analysed, it is seen that no significant difference has been found between the problem solving inventory total points of the students of Epoka and Selcuk University in terms of gender and field of study variables, but significant difference has been found in terms of age variable. Problem solving skill is increasing as the age is getting higher. It is seen that this difference is in favour of 20-22 and 23-25 age groups. Contrary to the findings obtained in that study, in a study carried out by Korkut (2002), it is understood that gender makes a significant difference in perception of problem solving skills. That difference can result from the fact that Korkut (2002) realised that study with high-school students. It can be said that university students in both countries give more importance to gender equality than the high-school students. It is thought that the difference rising in terms of age variable in problem solving inventory total points results from the fact that with the advancing age, experiences of the students increase, their problem perception changes and they could find different solution ways. In some researches, significant differences are observed between age variable and problem solving skill. Güler (2006) has detected that there is a significant difference between age variable and problem solving skill. In a study carried out by Nacar (2010), Nacar analysed problem solving skills between 20-30, 31-40, 41-50 and over 50 age groups, and found that the result is in favour of 41-50 and over 50 ages. That research results support our findings. However, Bozkurt, Serin and Erman (2004); Tavlı (2009) and Özğül (2009) couldn't reach a significant difference in the perceptions of problem solving skill in terms of age variable in their studies. There are also some studies supporting our findings that there is no significant difference in problem solving inventory total points in terms of field of study variable. In a study carried out by Yüksel (2008), Yüksel has reached a conclusion that there is no significant difference in problem solving skills in terms of field of study variable. Although the students in each country study in different fields, it can be said that they gain problem solving skill. However, in their studies, Taylan (1990); Genç and Kalafat (2007); Nacar (2010) has determined a significant difference in problem solving skills in terms of field of study variable.

According to the results obtained from the research, it has been seen that the students of Epoka University show more positive problem solving approach than the students of Selcuk University in terms of hasty, avoider and self-confident approach. It is found that problem solving total points don't show a significant difference according to gender and field of study variable; but show a significant difference in terms of *age* variable. According to that, problem solving skill is improved as the age is increasing.

The following suggestions can be made in line with the research results;

(1) Information works should be done for students studying in Selcuk University to learn problem solving process and activities should be programmed.
(2) Problem solving skill improvement work in students should be started in the first-grade, instructors should help the students to solve the problems they meet in the lessons, and even improve their problem solving skills creating problem situations.

(3) Problem solving skill between two countries can be also be searched in terms of demographical features such as socio-economic level. Similar researches intended to different age groups between two countries can also be done.
(4) Similar comparative researches can also be done between different countries.

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The Analysis of the Understanding Levels of Teacher Candidates in Different Departments about Basic Astronomy Concepts

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Learners face a variety of concepts during the instructional process they experience. These concepts are mostly introduced by teachers; thus, the competences of teachers in terms of teaching concepts are vitally important. The aim of this study is to detect the understanding levels of teacher candidates about basic astronomy concepts. The method of the study was a survey method. The sample of the study was composed of 293 teacher candidates from early childhood teacher education, primary school teacher education, elementary science education and physics education departments. The data were collected by the achievement test, which included three questions intended to help describe, draw and explain the movement. The data were analysed by using the two different understanding levels in the literature. The data obtained showed that the teacher candidates could not submit proper explanations for the concepts: the Earth, the Sun, the Moon, planets, stars and satellites. This situation can be interpreted as an indicator that teacher candidates did not have enough information about the basic astronomy concepts. When the departments were compared with respect to the understanding levels, it can be said that teacher candidates from elementary science teacher education and physics teacher education departments were at a better level of understanding than their counterparts in early childhood teacher education and elementary teacher education departments. We must ensure that candidates are aware of their deficiencies and for these deficiencies to be eliminated we present various opportunities about astronomy activities like finding the Sun and a star using Stellarium program for the candidates to help develop themselves.

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Introduction

Astronomy is one of the disciplines of science which humans have taken an interest in since the first ages and have conducted various studies on. It has begun to gain a place in instructional research, since it took its place in education programs. We encounter astronomy topics in almost every level of the instructional process in Turkey, so teaching astronomy has an importance, both in primary and secondary education, and in the institutions which train teachers (Küçüközer, Bostan &Işıldak, 2010). Percy (1998) mentioned the importance of teaching astronomy topics and stated that there were really important astronomy practises in our daily life. The author said the study of astronomy was beneficial because it included, not only experimental methods, but also a dimension related to observation. Moreover, it was asserted that astronomy is a science which teaches the individuals to think effectively, both correctly and logically (Tunca, 2005).

When the studies related to astronomy in the literature were analysed, these studies could be grouped into four headings to determine the perceptions of the participants representing different groups (students, teacher candidates, and teachers) about: (1) finding alternative concepts about basic astronomy topics and concepts (Klein, 1982; Atwood & Atwood, 1996, 1997; Kikas, 2005; Kalkan & Kıroğlu, 2007; Cin, 2007; Emrahoğlu & Öztürk, 2009; Frede, 2006; Kallery, 2011; Wallace, Prather & Duncan, 2011, 2012; Kurnaz, 2012; Durukan & Sağlam-Arslan, 2013; Taşcan, 2013); (2) applying conceptual change processes about basic astronomy topics and concepts (Callison & Wright, 1993; Ercan, Taşdere & Ercan, 2010; Trundle, Atwood & Christopher, 2002, 2006, 2007; Trumper, 2006a; Küçüközer, Bostan & Işıldak 2010; Şahin, Bülbül & Durukan, 2013); (3) determining mental models basic astronomy topics and concepts (Vosniadou & Brewer, 1992; Liu, 2003; Panagiotaki, Nobes & Potton, 2008; Straatemeier, Van der Mass & Jansen, 2008; İyibil & Sağlam-Arslan, 2010) and (4) applying learning progression basic astronomy topics and concepts (Plummer, 2014). The researches, which was aimed at understanding the perceptions of the participants related to astronomy concepts, revealed that the participants usually did not acquire knowledge at an adequate level (Barba & Rubba, 1992; Summers & Mant, 1995; Atwood & Atwood, 1996, 1997; Suzuki, 2003; Frede, 2006; Kalkan & Kıroğlu, 2007; Emrahoğlu & Öztürk, 2009); however, there were a small number of studies which aimed at correcting the lack of knowledge and misconceptions (Küçüközer et al., 2010; Trumper, 2006a; Ercan et al., 2010).

The Importance and Purpose of the Study

Students encounter many concepts and subjects in different levels from primary education to higher education throughout the formal education process, which lasts 12 years on average in Turkey, and they acquire knowledge related to these concepts and subjects. In this process, teachers play a vital role in bringing the subjects into the classroom environment and helping the students to reach the desired learning outcomes. The ability of the teachers to perform their duties is closely related to their professional qualities and qualifications (Erden, 2005). These qualities are comprised of: general knowledge, content knowledge and professional knowledge and skills (Erden, 2005). Therefore, the teachers' content knowledge is very important because teachers are in a position to affect the educational life of their students (Karal, 2003). In other words, when the teacher's content knowledge is inadequate, this situation is reflected in their students. As the studies of Karal (2003) has emphasised, academic achievement and student performance depend on the teacher.

Many studies carried out in the field of astronomy education and teaching have investigated the knowledge of teacher candidates about astronomy concepts, and/or their understanding

levels of these concepts (Barba & Rubba, 1992; Summers & Mant, 1995; Atwood & Atwood, 1996, 1997; Suzuki, 2003; Frede, 2006; Kalkan & Kıroğlu, 2007; Emrahoğlu & Öztürk, 2009), and the effectiveness of the instructional process prepared to correct the lack of knowledge inherent in the teacher candidates (for example; Callison & Wright, 1993; Trumper, 2001, 2006a, 2006b; Trundle et al., 2002, 2006, 2007; Küçüközer, 2007; Mullholland & Ginns, 2008; Ercan et al., 2010).These studies generally focused on the same astronomy concepts such as the Earth, Sun and Moon, etc. But there are different concepts for which there are almost no studies like planet, star and satellite. At the same time, the understanding levels of teacher candidates in different fields regarding basic astronomy concepts were not determined; it was revealed that a study is required to be carried out in this context. Moreover, the examination of the knowledge the teacher candidates have acquired will be a reflection of the formal education they have had throughout their educational life and it will also help to determine the deficiencies in this field. As this situation is one of results of the effect of our education system on the individual, it shows the importance of the research from a different viewpoint.

The aim of the study is to determine the understanding levels of the teacher candidates who are studying in different teacher education departments (Physics, Elementary Science, Primary School and Early Childhood Teacher Education) about astronomy concepts and to seek answers for the following research questions:

- What are the understanding levels of basic astronomy concepts by the teacher candidates in different departments?
- How a relation is there between the understanding levels of the teacher candidates on the basic astronomy concepts?

Method

The study was carried out by survey research, one of the descriptive research methods, which aims at describing the phenomena to be analysed in the best way and to determine the current situation (Çepni, 2007). Because the phenomena to be analysed is described as it is and the study environment is not interfered with during the process (Cohen & Manion, 1994; Karasar, 2009), this method was thought to be suitable for the environment of the study in the survey method.

Sampling

The sample of the study was comprised of 293 teacher candidates studying in their final year in an Education Faculty in the departments of early childhood teacher education (74 participants), primary school teacher education (70 participants), elementary science teacher education (87 participants), and physics teacher education (62 participants) in the Eastern Black Sea region of Turkey.

The knowledge and skills which the teacher candidates gained throughout their education life about the field of astronomy can be listed as follows: within the framework of a life-science course under the theme of ‘Yesterday, Today, Future’, the students learned the concepts of the Earth and the Sun in the 1st grade, the same concepts, their motions and what can see when look up the sky in the 2nd grade, the Moon and its phases, the Earth and its motion and the concepts of the Sun in the 3rd grade (MEB, 2009). Within the framework of a Science and Technology course under the field of the ‘Earth and the Universe’, the students learned the subjects related to the shape of the Earth and its structural properties in the 4th grade, the size

of the Earth, the Sun and the Moon and their motions, and they were able to distinguish these concepts from each other in the 5th grade (MEB, 2009). Within the framework of the Science and Technology course, the materials which form the lithosphere, the place and the importance of these materials in our life were studied. In the 7th grade, the students were introduced to the basic concepts, such as galaxy, planet, star, comet, and constellation. They were also introduced to the Solar System and optical instruments used for space exploration. In the 8th grade, the formation of the Earth, plate tectonics, and the climate phenomena in the atmosphere were mentioned and the importance of these events in our daily life was addressed (MEB, 2009). The teacher candidates are expected to comprehend the basic astronomy concepts, which are presented in a spiral structure in teaching curricula, with life-science and science and technology courses in elementary education (Türkoğlu, Örnek, Gökdere, Süleymanoğlu & Orbay, 2009).

Data Collection Tool

An achievement test was developed by the researchers and was used as a data collection tool within the study. While the achievement test was being developed, firstly the teaching programs were examined and then the basic astronomy concepts, which the participants were supposed to know, were determined. The following questions were composed by taking into consideration the concepts which were identified and their features.

(1) Could you explain the concepts given below respectively? You can support your explanations by giving examples.
(2) Earth, Sun, Moon, Planet, Star, Satellite
(3) Could you draw shapes of these celestial bodies?
(4) Do these celestial bodies move? If so, how do you explain the movement of these celestial bodies?

In the first question of the achievement test was asked the participants to identify these concepts. In the second question was asked the teacher candidates do draw the shapes belonging to these concepts. In the third question was asked views the participants about the celestial bodies' movements. In the fourth question, the relationship between the celestial body pairs was determined by the researcher and reasons for the explanation were asked for.

The Validity of the Study

In order to determine the validity of the achievement test, it was piloted with 21 the mathematics teacher candidates who were studying in the same faculty. We analyzed whether the questions were compatible with the purpose of the research, and whether they were clear and answerable in line with the data obtained. In the pilot study, teacher candidates were asked about the basic features of celestial bodies.. The data obtained showed that more details, such as movement and shape regarding celestial bodies should be asked for, in addition to basic features. Moreover, three physics education experts' views were taken into account regarding the test. In the light of the pilot data and readjustments, we prepared the final version of the achievement test.

Data Analysis

The understanding levels generated by Abraham, Williamson and Westbrook (1994) would be used in order to determine the conceptual understanding levels, in similar studies in the literature (for example, Çalık & Ayas, 2005; Sağlam-Arslan & Devecioğlu-Kaymakçı,

2010). The following understanding levels were used for the analysis of the definitions of these concepts, and the responses given to the questions about whether these concepts move or not, were included in this study.

Table 1. Understanding levels and explanations used in data analysis for the explanations related to concepts

Understanding Levels	Explanations
[0] No response	Not responding the question; repeating the question asked; irrelevant responses Responses such as 'I don't know', 'I don't remember'
[1] No Understanding	Unscientific responses
[2] Partial Understanding	Short answers; responses consisting of partial scientific knowledge; giving only examples
[3] Restricted understanding	Incomplete answers, responses containing the one or more aspects of scientific responses
[4] Sound Understanding	Scientific responses

In Table 2, the following levels, generated by Kara, Erduran-Avcı and Çekbaş (2008) and Uzunkavak (2009), were used for the analysis of the drawings related to basic astronomy concepts.

Table 2. Understanding levels and explanations used in data analysis for the drawings of the shapes related to concepts

Understanding Levels	Explanations
0	No illustration
1	Wrong illustration
2	Correct illustration which includes wrong elements
3	Correct but incomplete illustration (not including error)
4	Completely correct and complete drawing

To ensure the reliability of the results, classification of the teacher candidates' responses according to the understanding levels were checked by another expert studied in this area.

In terms of presentation of the findings and convenience for discussion, the frequencies of the responses of the participants at different understanding levels were taken into account separately, both among the participants studying in the same department and among the participants taking part in the study, and then their percentages were calculated. The participants taking part in the study were coded by taking into consideration the departments (ECTE for early childhood teacher education, PSTE for primary school teacher education, ESTE for elementary science teacher education, and PTE for physics teacher education) and examples from the expressions and drawings of the participants were presented.

The Chi-Square Test be done with SPSS 16.0 program for each of the features of concepts and to determine whether there is significant differences in understanding levels according to their department or not.

Findings

The findings obtained from the achievement test were presented under four headings after "the concept-concept example" matching was performed.

Understanding levels related to the planet - the Earth

Table 4 presents the distribution of responses given by the teacher candidates to the questions asked about the planet and the Earth, in terms of understanding levels.

Table 4. Understanding levels of the responses of the teacher candidates related to the planet and the Earth.

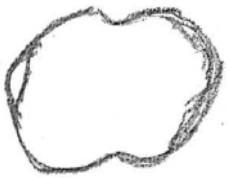
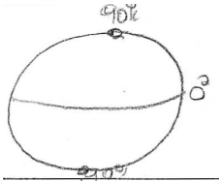
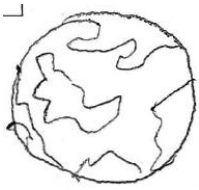
		THE PLANET					THE EARTH				
		ECTE	PSTE	ESTE	PTE	TOTAL	ECTE	PSTE	ESTE	PTE	TOTAL
Theme	Levels	f (%)	f (%)	f (%)	f (%)	f(%)	f (%)	f (%)	f (%)	f (%)	f(%)
Definition	[0]	26 (34)	25 (36)	12 (14)	12 (19)	75 (25)	12 (16)	18 (26)	2 (2)	6 (10)	38 (13)
	[1]	27 (36)	38 (54)	48 (55)	38 (61)	151 (52)	24 (32)	15 (21)	19 (22)	11 (18)	69 (24)
	[2]	22 (30)	7 (10)	27 (31)	10 (16)	66 (22)	31 (42)	20 (29)	39 (45)	24 (39)	114 (39)
	[3]	-	-	-	2 (3)	2 (1)	7 (10)	17 (24)	27 (31)	21 (33)	72 (24)
	[4]	-	-	-	-	-	-	-	-	-	-
Illustration	[0]	17 (23)	5 (8)	10 (12)	13 (21)	45 (15)	4 (5)	3 (4)	1 (1)	4 (6)	12 (4)
	[1]	-	1 (1)	2 (2)	5 (8)	8 (3)	-	-	2 (2)	2 (3)	4 (1)
	[2]	2 (3)	1 (1)	-	-	3 (1)	21 (28)	33 (47)	34 (39)	28 (45)	116 (40)
	[3]	-	3 (4)	-	4 (6)	7 (2)	47 (64)	34 (49)	45 (52)	27 (44)	153 (52)
	[4]	55 (74)	60 (86)	75 (86)	40 (65)	230 (79)	2 (3)	-	5 (6)	1 (2)	8 (3)
Movement	[0]	25 (34)	17 (24)	9 (10)	7 (11)	58 (20)	2 (3)	1 (1)	-	-	3 (1)
	[1]	5 (7)	8 (11)	4 (5)	3 (5)	20 (7)	1 (1)	-	-	2 (3)	3 (1)
	[2]	30 (41)	29 (42)	32 (37)	28 (45)	119 (40)	11 (15)	11 (16)	12 (14)	12 (19)	46 (16)
	[3]	11 (15)	9 (13)	24 (28)	15 (25)	59 (20)	19 (26)	12 (17)	16 (18)	9 (15)	56 (19)
	[4]	3 (4)	7 (10)	18 (21)	9 (15)	37 (13)	41 (55)	46 (66)	59 (68)	39 (63)	185 (63)

When Table 4 was analysed, it was determined that the responses of the teacher candidates to the question about the definition of the planet were usually at the level of not being able to understand (Level 1, 52%) and to the question about the definition of the Earth was at the level of partial understanding (Level 2, 39%). The teacher candidates usually defined 'the planet' as an object belonging to a system and they gave the celestial bodies as the Earth, Moon, and Mercury, as examples. However, there were teacher candidates, such as PTE35, who made more scientific definitions such as "Planets are massive objects revolving around a star like the Earth. They exist in liquid or gas form". The teacher candidates used the following expressions of "the place which we live in, residence, planet, system" for the Earth, which is an example of the 'planet' concept. The responses such as "the planet where we live" (ECTE17), "the planet which accommodates both living and non-living beings" (PTE55) or "one of the planets which exists in the solar system" (ESTE48) were assessed to be in the partial understanding category, where the majority of responses of the candidates were concentrated. Based on the responses, it can be stated that the teacher candidates thought the 'planet concept' was different kinds of celestial bodies (such as a star or satellite) belonging to the Solar System and they made overgeneralizations for this concept. When the teacher candidates' distribution according to their understanding levels were analysed, it showed variability in terms of the departments where they studied. While 31% of the teacher candidates were at Level 2 for the question related to the definition of a planet, 31% of the teacher candidates were at Level 3 for the definition of the Earth. While only 3% of the

physics teacher candidates could answer the question related to the definition of a 'planet' at so-called Level 3, 33% of them could answer the question related to the definition of the Earth at Level 3. While 30% of early childhood teacher candidates and 10% of primary school teacher candidates were at Level 3 for the question related to the definition of a planet, 10% of early childhood teacher candidates and 24% of the elementary teacher candidates were at Level 3 for their definition of the Earth. In this case, it can be stated that elementary science and physics teacher candidates gave more scientific responses than the candidates studying in the other departments. It can be stated that the case determined was related to the courses (particularly the astronomy course) instructed in the department.

It was revealed that 79% of the teacher candidates did illustrations for the question related to the shape of the planet at the sound understanding level (Level 4) but 52% of them made illustrations for the question related to the shape of the Earth at the restricted understanding level (Level 3). The candidates drew the Earth only as a round shape or globe. However, although the candidates could not define the planet, the spherical illustrations they made for the shape of the planet held the qualification of correct illustrations. When the distribution of the illustrations in terms of understanding levels was analysed, 86% of elementary science and primary school teacher candidates were at sound understanding level (Level 4) for the 'planet' concept, but it was revealed that 64% of early childhood teacher education teacher candidates made illustrations at a more scientific level for the Earth as a concept example. The responses of physics teacher candidates drew attention because their responses were at lower understanding levels, when compared to the teacher candidates studying in other departments. The examples belonging to the illustrations of the participants in terms of their understanding levels are presented in Table 5.

Table 5. Examples from the illustrations of the candidates related to the planet and the Earth

	Levels			
	[1]	[2]	[3]	[4]
The Planet	 (PSTE16)	 (ECTE1)	 (PSTE1)	 (ESTE16)
The Earth	 (ESTE31)	 (PSTE33)	 (ECTE1)	 (ECTE63)

In the question which asked whether the given celestial bodies moved or not and if they were moving, the teacher candidates were asked to explain this movement: 40% of the teacher candidates were at partial understanding level (Level 2) for the 'planet' concept and 63% of them were at sound understanding level (Level 4) for the Earth. While these teacher candidates stated that the planet was revolving in an orbit, some teacher candidates determined that the planets did not move, or that they thought that only the Earth out of all the planets moved. The statement of the participant coded as ECTE45 can be given as an example to support this view: "Only the Earth among the planets moves." The teacher candidates

stated for this question that the Earth rotated by itself and that it also revolved around the Sun. The teacher candidates who answered the movement of the Earth question correctly differed in opinion on topics where they had unscientific knowledge about how the planet moved and if the planet was motionless or if it moved around a specific orbit and they had not acquired the knowledge that the planets rotated by themselves. When the distributions in terms of understanding levels were analysed, there was not a significant difference between the teacher candidates in terms of the departments they study in for this question and the teacher candidates gave responses at the partial understanding level for the 'planet' concept (41%, 42%, 37%, and 45%, respectively) and sound understanding level for the Earth (55%, 66%, 68%, 63%, respectively). The emphasis made on the movements of the celestial bodies, and particularly the movements of the Earth, Moon and Sun, which have been included in the astronomy topics of the teaching programs since the primary school level, might be counted as the reason for this case.

When the distribution of the responses in terms of understanding levels were analysed, it could be stated that elementary science teacher candidates made explanations which included more scientific elements when compared to the teacher candidates in the other departments. For example, the explanations made by 21% of the elementary science teacher candidates about the movements of the planets were at scientific understanding level. Moreover, the concentration of the distribution of the responses related to the Earth, in terms of understanding level, and the distribution of the responses related to the 'planet' concept in terms of understanding level on different levels drew attention. The distribution with the question which required the definition of the Earth and 'planet' can be given as an example. While the definitions of the candidates about the Earth usually took place at "the partial understanding level", their definitions about the 'planet' took place at the level of not understanding. We can reach the conclusion that, although the teacher candidates knew that the Earth is a planet, they answered the questions about our world by taking into consideration the events they experienced in their daily lives (with expressions such as "the Earth is formed from water, stone and soil" (PSTE42)), but they could not make a clear definition and explanation for the 'planet' concept. The findings related to the planet and Earth are presented in Table 7 for the question which asked the teacher candidates to express the relationship between the concept pairs given in the achievement test.

Most of the teacher candidates (71%) defined 'the star' as a celestial body which radiates the light it gets from various sources (such as the Sun); these definitions are at the level of not understanding. The statements such as "It reflects the light it gets from the Sun. It is the source of light at night" (ECTE10) and "a meteorite which gets light from the Moon and reflects it on the Earth" (PSTE51) can be given as examples to responses at this level.

Table 7. Understanding levels of the responses of the teacher candidates related to the star and Sun

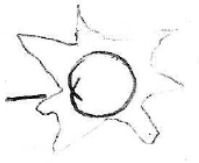
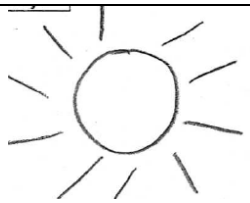
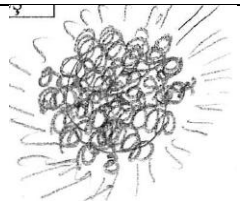
		THE STAR					THE SUN				
		ECTE	PSTE	ESTE	PTE	TOTAL	ECTE	PSTE	ESTE	PTE	TOTAL
Theme	Level	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Definition	[0]	19 (26)	23 (3)	11 (13)	17 (27)	70 (24)	10 (14)	14 (20)	3 (3)	4 (6)	31 (11)
	[1]	55 (74)	45 (64)	69 (79)	40 (65)	209 (71)	57 (77)	48 (69)	66 (76)	38 (61)	209 (71)
	[2]	-	2 (3)	6 (9)	5 (8)	13 (4)	7 (9)	7 (10)	13 (15)	15 (25)	42 (14)
	[3]	-	-	1 (1)	-	1 (1)	-	1 (1)	5 (6)	5 (8)	11 (4)
	[4]	-	-	-	-	-	-	-	-	-	-

Illustration	[0]	8 (11)	2 (3)	10 (11)	13 (21)	33 (11)	4 (5)	2 (3)	-	5 (8)	11 (4)
	[1]	60 (82)	68 (97)	73 (84)	45 (73)	246 (84)	6 (8)	10 (14)	15 (17)	7 (11)	38 (13)
	[2]	6 (8)	-	4 (5)	4 (6)	14 (5)	64 (87)	58 (83)	71 (82)	50 (81)	243 (82)
	[3]	-	-	-	-	-	-	-	1 (1)	-	1 (1)
	[4]	-	-	-	-	-	-	-	-	-	-
Movement	[0]	24 (32)	11 (16)	20 (23)	19 (31)	74 (25)	12 (16)	8 (11)	12 (14)	10 (16)	42 (14)
	[1]	27 (37)	26 (37)	25 (29)	22 (35)	100 (34)	47 (64)	49 (70)	41 (47)	25 (40)	162 (56)
	[2]	21 (28)	32 (46)	35 (40)	19 (31)	107 (36)	9 (12)	8 (11)	18 (21)	10 (16)	45 (15)
	[3]	2 (3)	1 (1)	6 (7)	2 (3)	11 (4)	6 (8)	5 (8)	16 (18)	17 (28)	44 (15)
	[4]	-	-	1 (1)	-	1 (1)	-	-	-	-	-

When the candidates' definitions related with the Sun were examined, it is seen that an important number of the definitions made by the teacher candidates, were such as: "the sun warms us", or is "a system that gives and provides light" or "the source of energy" were at the level of not understanding (Level 1: 71%). The statement such as "It is the energy source of the system which is formed of planets, stars and such celestial bodies" (ESTE79) can be given as an example of the definitions given by the teacher candidates. The Sun was defined by some teacher candidates as a planet which can be supported with the following statement: "It is a planet which is in space, made up of fire and which we use its light and heat as the source of energy" (ECTE58). With the responses at restricted understanding level (Level 3, 4%), the statements such as the Sun "is a small star which is the light and heat source for all the planets and satellites in its system. It includes "He and H_2" in its composition" (ESTE30) or "The Sun is our medium-sized star. The Earth revolves around the Sun and the Sun revolves in its own orbit" (PTE35) can be given as examples of the correct responses related to the definition. When the distribution in terms of understanding levels was analysed, it was revealed that the responses, which included scientific elements about the definitions of the Sun and star belonged to elementary science and physics teacher candidates. While 1% of the teacher candidates were at restricted understanding level for the concept of 'star', 4% of them were at restricted understanding level for the Sun.

When the distribution of the illustrations of the teacher candidates in terms of understanding level was analysed, the majority of teacher candidates drew shapes which were at not understanding level (Level 1, 84%) for 'the star' and partial understanding level (Level 2, 82%) for the Sun. The teacher candidates depicted the shape of the Sun as spherical but they depicted 'the star' by drawing a pentagram as it is on our Turkish flag. Furthermore, 82% of early childhood teacher candidates, 97% of primary school teacher candidates, 84% of elementary science teacher candidates and 73% of physics teacher candidates made illustrations at the level of not understanding regarding the question about 'the star' and 87%, 83%, 82% and 81% of the teacher candidates illustrated the Sun at the level of partial understanding, respectively. A few examples of illustrations by the teacher candidates are presented below, in terms of understanding levels (Table 8).

Table 8. Examples of illustrations by the teacher candidates for the concepts of 'the star' and the Sun.

	Levels		
	[1]	[2]	[3]
The Star	 (ECTE67)	 (ECTE40)	---
The Sun	 (PSTE68)	 (ECTE52)	 (ESTE70)

While the responses related to the movement of the 'star' are stuck at the level of not understanding (Level 1, 34%) and partial understanding (Level 2, 36%), the responses related to the movement of the Sun are at the level of not understanding (Level 1, 56%). There were teacher candidates who thought that the stars are fixed, in other words, are motionless, besides the teacher candidates who thought that the stars move. However, they explained the movements of the stars with expressions which included misconceptions, such as: shooting star, falling star and the eclipse of the star. When the teacher candidates were asked to explain the movement of the Sun, it was determined that, while some teacher candidates thought that the Sun was motionless, the rest of the teacher candidates thought that the Sun was moving but they could only explain some movements of the Sun. The statements of the candidates, such as "it revolves around its own axis" (PSTE17), "it moves in the Milky Way galaxy" (ESTE74) or "it revolves around itself, it roams around the Milky Way" (PTE35) can be given as examples. Elementary science and physics teacher candidates made up the majority of the teacher candidates who could explain the movements of the Sun and 'the star'. For example, 18% of elementary science teacher candidates and 28% of physics teacher candidates could explain the movement of the Sun at the level of restricted understanding (Level 3). This situation can be explained because the candidates studying in the other departments were not interested in astronomy topics, but also it can be attributed to the teacher candidates' not having knowledge about space, except the solar system. When the distribution of the responses of the teacher candidates related to the departments they were studying in terms of understanding levels were analysed, elementary science and physics teacher candidates could answer the questions at higher understanding levels. Between the responses of the teacher candidates to the questions related to the concept of 'star', the difference which revealed itself in terms of the departments they were studying in occurred at the understanding levels related to the movement of the stars.

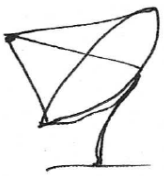
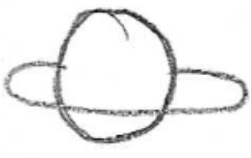
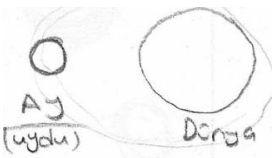
The findings related to the concepts of the Sun and 'star' are presented in Table 9 for the question which asks for explanations of the relationship between the concept pairs given to the candidates in the achievement test.

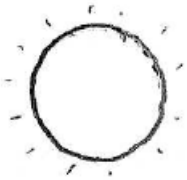
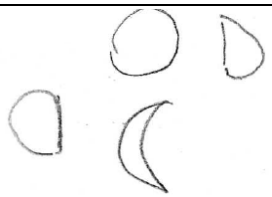
Table 10. Understanding levels of responses of the teacher candidates related to the satellite and the Moon

		THE SATELLITE					THE MOON				
		ECTE	PSTE	ESTE	PTE	TOTAL	ECTE	PSTE	ESTE	PTE	TOTAL
Theme	Level	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Definition	[0]	38 (51)	39 (56)	26 (30)	25 (40)	128 (43)	12 (16)	19 (27)	4 (5)	5 (8)	40 (14)
	[1]	5 (8)	11 (16)	14 (16)	10 (16)	40 (14)	33 (45)	8 (11)	5 (6)	11 (18)	57 (19)
	[2]	27 (36)	13 (19)	20 (23)	10 (16)	70 (24)	3 (4)	1 (1)	6 (7)	4 (6)	14 (5)
	[3]	4 (5)	7 (10)	27 (31)	15 (24)	53 (18)	23 (31)	37 (53)	44 (50)	28 (45)	132 (45)
	[4]	-	-	-	2 (3)	2 (1)	3 (4)	5 (8)	28 (32)	14 (22)	50 (17)
Illustration	[0]	27 (37)	28 (40)	21 (24)	20 (32)	96 (33)	5 (7)	2 (3)	1 (1)	5 (8)	13 (4)
	[1]	14 (19)	13 (19)	10 (12)	7 (11)	44 (15)	2 (3)	-	-	-	2 (1)
	[2]	7 (9)	1 (1)	-	2 (3)	10 (3)	44 (59)	29 (42)	18 (21)	16 (26)	107 (37)
	[3]	-	-	1 (1)	7 (11)	8 (3)	6 (8)	12 (17)	22 (25)	14 (22)	54 (18)
	[4]	26 (35)	28 (40)	55 (63)	26 (42)	135 (46)	17 (23)	27 (38)	46 (53)	27 (44)	117 (40)
Movement	[0]	37 (50)	20 (29)	18 (21)	17 (27)	92 (30)	15 (20)	6 (9)	7 (8)	6 (10)	34 (11)
	[1]	2 (3)	9 (13)	9 (10)	4 (6)	24 (8)	5 (7)	7 (10)	5 (6)	5 (8)	22 (8)
	[2]	25 (33)	27 (38)	28 (32)	23 (38)	103 (35)	26 (35)	24 (33)	20 (23)	12 (19)	82 (28)
	[3]	2 (3)	1 (1)	2 (2)	1 (2)	6 (2)	22 (30)	20 (29)	42 (48)	28 (45)	112 (38)
	[4]	8 (11)	13 (19)	30 (35)	17 (27)	68 (23)	6 (8)	13 (19)	13 (15)	11 (18)	43 (15)

When the distribution of the teacher candidates in terms of understanding levels were analysed, elementary science teacher candidates gave responses at higher levels when defining both 'the satellite' (Level 3, 31%) and the Moon (Level 4, 32%) but physics teacher candidates gave responses at higher levels when defining only the Moon (Level 4, 22%). It can be stated that early childhood teacher education and primary school teacher candidates had difficulty in defining the concept of the Moon (Level 0: 51% and 56%, respectively). It was found that the responses about the shape of the Moon were usually at the level of sound understanding (Level 4, 46%) and the responses about the shape of the Moon were usually at the level of partial understanding (Level 2, 37%) and sound understanding (Level 4, 40%). When the shape of the satellite was asked to be drawn, the teacher candidates drew either the Moon or the artificial satellites. The teacher candidates usually illustrated the Moon in the shape of a crescent. Very few teacher candidates drew the phases of the Moon for the shape of the Moon. The illustrations belonging to these examples are presented in Table 11.

Table 11. Examples from the drawings of the teacher candidates related to the concepts of 'the satellite' and the Moon.

	Levels			
	[1]	[2]	[3]	[4]
The Satellite	 (ECTE49)	 (ECTE29)	 (PTE22)	 (PSTE43)

The Moon	 (ECTE42)	 (ESTE74)	 (PSTE34)	 (PSTE37)

While the teacher candidates were explaining the movements of 'the satellite', they made explanations which were evaluated at different understanding levels. 50% of the early childhood teacher candidates usually were not able to answer, 38% of primary school and physics teacher candidates were at the level of partial understanding, and 35% of elementary science teacher candidates were at the level of sound understanding. It was found that the teacher candidates at the level of partial understanding (Level 2, 35%) thought that 'the satellite' moved in the orbits. Also, it was found that the teacher candidates at the level of restricted understanding (Level 3, 2%) thought that if the satellite enters the planet's gravitational field, it revolves. When the understanding levels of the teacher candidates related to the movements of the Moon were analysed, early childhood and primary school teacher candidates were at the level of partial understanding (Level 2: 35%, 33%, respectively) and elementary science and physics teacher candidates were at the level of restricted understanding (Level 3: 48%, 45%, respectively). The teacher candidates stated that the Moon revolves both around the Earth and its own axis and added that the Moon revolves around the Sun indirectly. Some teacher candidates determined that the Moon was motionless but it looks as if it is moving due to the movements of the Earth. These teacher candidates tried to explain their views with statements such as "The Moon does not revolve. The Earth rotates but it stands still" (ECTE68). In this understanding level, while the number of the teacher candidates who pointed out that the Moon revolves around the Earth was more in number; the number of teacher candidates who stated that 'the satellite' revolves around the planet whose gravitational field it enters was few in number. Moreover, while some teacher candidates explained the movements of the Moon around its own axis, there were no teacher candidates who explained the similar movements of 'the satellite'. When the distribution of the teacher candidates in terms of understanding levels was taken into consideration, it was found that elementary science teacher candidates were at higher levels.

Elementary science teacher candidates gave responses to the questions which asked for the definition and movement of 'the satellite' at higher understanding levels than the teacher candidates studying in the other departments. When the understanding levels for the responses they gave to the other questions were evaluated, there was no difference between them with respect to their departments. When the understanding levels of the teacher candidates with respect to their departments were analysed, these teacher candidates were only at the same understanding level for the question related to the structure of the Moon. When the level of distribution for the other questions about the Moon was examined, it was revealed that the elementary science and physics teacher candidates were at higher understanding levels than the early childhood and primary school teacher candidates.

Chi Square analysis between the departments

The Chi-Square Test is done for each of the features of concepts and to determine whether there have been significant differences in understanding levels according to their department and the results are given in Table 12.

Table 12. Chi-square test results about the relationship between candidates' department and understanding levels

	Analysis			
	χ^2	p	χ^2	p
Concept Features	Planet		The Earth	
Definition	25,121	.000	34,550	.000
Shape	11,360	.010	10,101	.120
Movement	33,136	.001	8,145	.520
Relation	4,670	.862		
Concept Features	Star		The Sun	
Definition	16,566	.011	27,338	.001
Shape	17,503	.008	9,970	.126
Movement	14,877	.094	23.040	.006
Relation	6,749	.663		
Concept Features	Satellite		The Moon	
Definition	37,409	.000	82,972	.000
Shape	28,771	.001	42,549	.000
Movement	27,415	.001	21.765	.040
Relation	18,642	.028		

The results of Chi Square Test shows that there are differences in terms of departments for planet's definition [$\chi^2_{(6)}$= 25,121, p<0.05], shape [$\chi^2_{(3)}$= 11,360, p<0.05] and movement [$\chi^2_{(12)}$= 33,136, p<0.05]. For the Earth, there is difference between definition [$\chi^2_{(9)}$= 34,550, p<0.05], but shape [$\chi^2_{(6)}$= 10,101, p>0.05] and movement [$\chi^2_{(9)}$= 8,145, p>0.05]. Any significant difference wasn't found for the relationship between planet-the Earth in terms of departments [$\chi^2_{(9)}$= 4,670, p>0.05].

It can be seen in Table 13 that in terms of departments the significant differences for star's definition [$\chi^2_{(6)}$= 16,566, p<0.05] and shape [$\chi^2_{(6)}$= 17,503, p<0.05], but movement [$\chi^2_{(9)}$= 14,877, p>0.05]. For the Sun, while definition [$\chi^2_{(9)}$= 27,338, p<0.05] and movement [$\chi^2_{(9)}$= 23,040, p<0.05] have significant differences, there is no significant difference for the shape [$\chi^2_{(6)}$= 9,970, p>0.05]. The relationship between star-the Sun in terms of departments isn't significant difference [$\chi^2_{(9)}$= 6,749, p>0.05].

The Chi-Square Test results for each feature (definition, shape and structure) of satellite and moon were showed that there is a significant difference in terms of departments [satellite, $\chi^2_{definition\ (9)}$= 37,409, p<0.05, $\chi^2_{shape\ (9)}$= 28,771, p<0.05, $\chi^2_{movement\ (9)}$= 27,415, p<0.05; the Moon, $\chi^2_{definition\ (12)}$= 82,972, p<0.05, $\chi^2_{shape\ (9)}$= 42,549, p<0.05, $\chi^2_{movement\ (12)}$= 21.765, p<0.05]. The meaningful difference for relationship between satellite-the Moon is found [$\chi^2_{(9)}$= 18,642, p<0.05].

Discussion and Conclusion

The findings from this study reveal that the candidates have difficulty in answering questions related to basic astronomy concepts at a scientific understanding level. The results show similarities with the results of the studies carried out both with the teacher candidates and the teachers on this topic by different researchers (Barba & Rubba, 1992; Summers & Mant, 1995; Atwood & Atwood, 1996, 1997; Zeilik, Mattern, Schau, Hall, Teague & Bisard, 1997; Zeilik, Mattern & Schau 1999; Trumper, 2001, 2006a, 2006b; Rutherford, 2004;

Hudgins, 2005; Frede, 2006; Kalkan & Kıroğlu, 2007; Küçüközer, 2007; Emrahoğlu & Öztürk, 2009; İyibil & Sağlam-Arslan, 2010).

The teacher candidates generally defined the Earth as the planet "where we live" and they could not make more scientific explanations. Similarly, in the study conducted by Barba and Rubba (1992), it was stated that the candidates lacked basic knowledge relating to the Earth. It was determined with the illustrations that the candidates thought that the Earth and 'the planet' only had a spherical shape but they did not emphasize the geoid shape of the Earth. In parallel with this finding, Sneider and Ohadi (1998), found the participants preferred the spherical shape among the choices presented to them for the shape of the Earth.

The participants who defined 'the star' as a celestial body which radiates the light it gets from various sources also appear in the studies conducted by Ünsal, Güneş and Ergin (2001), Emrahoğlu and Öztürk (2009) and İyibil and Sağlam-Arslan (2010). Similarly in the studies of Agan (2004) and Bailey (2006), the teacher candidates defined the Sun as a star. However, as Emrahoğlu and Öztürk (2009) and İyibil and Sağlam-Arslan (2010) pointed out in their studies; the participants explained that the Sun is a planet. Although there was no difference between the illustrations of the participants in terms of the departments, it can be stated that they had misconceptions which have been previously determined in the literature (İyibil & Sağlam-Arslan, 2010) about the shape of the star. It can be stated that teacher candidates' illustrations resulted from the experiences they had had in their daily life (for example, the spherical illustration of the sun) and the reflections of our culture (for example, the illustration of the star as a pentagram on the Turkish flag).

Although the teacher candidates usually illustrated crescent, few teacher candidates drew the phases of the Moon instead of the shape of the Moon. The studies carried out in the literature were mostly interested in the phases of the Moon, they evaluated the developments in this field by applying the activities prepared to the participants, and an improvement was recorded in the levels of the participants. It was found that the individuals participating in these studies (Suzuki, 2003; Trundle et al., 2002, 2006, 2007; Mullholland & Ginns, 2008) made more correct illustrations about the phases of the Moon and they could explain the reasons for the formation of the phases as a result of the activities.

In the literature, numerous studies have been carried out with the concepts of the Sun, the Earth, the Moon and their relationships. In addition, in this study, the relationships between the concept (i.e., 'planet') and examples of the concept (i.e., the Earth) were asked about in the questionnaire. Nevertheless, the teacher candidates were not able to establish relationships between astronomy concepts at an adequate level and they could not match the concept and examples of a concept (Also see, Table 13). Although most of the teacher candidates defined the Earth as a planet, it was found that they had different explanations for the concepts of the Earth and 'the planet'. Similarly, when the concepts of 'the star' and the Sun were taken into consideration, it was revealed that the candidates explained that the Sun was a star and they stated that the stars get their light from the Sun. Based on this point of view, it can be suggested that the teacher candidates did not acquire knowledge at a scientifically acceptable understanding level about basic astronomy concepts without taking into consideration the departments. In addition, we may consider the candidates' reasoning ability. Exemplarily, the Earth is a concrete example of the abstract concept of 'the planet'. Starting from this point, it would be expected that teacher candidates would make scientific explanations about the concept of a planet through the Earth. However, the teacher candidates barely explained the concept of 'the planet' and there was a difference between the understanding levels of the

concept of 'the planet' and the Earth. Moreover, because the current situation has not been interfered with, the results obtained within the context of the study can be considered as an indicator that teacher candidates, so far, have not been able to actualize permanent learning as they could not structure how the information which was to be acquired was related to these concepts throughout the instruction they have received.

About the celestial motions in the daily life, Vosniadou and Brewer (1994) found that the children tried to explain day and night in terms of the sun going down behind the hills or being covered by clouds, or they gave explanations based on the notion that the sun revolves around the earth or the earth revolves around the sun or rotates around its axis. In addition, some studies found that children may explain the initial learning that the Sun - the Moon move up and down but not move across the sky (not moving through the horizontal direction) (Plummer, 2009, 2014; Plummer, Wasko, & Slagle, 2011). Literature on children's ideas about the celestial motion indicated that children may have unscientifically knowledge. In this study, although teacher candidates could explain the movements of the Earth, the Sun and the Moon, they tried to explain planet, star and satellite movements unscientifically. It is seen that teacher candidates couldn't reason movements of the Earth, the Sun and the Moon through movements of planet, star and satellite.

It was found that the responses of early childhood and primary school teacher candidates were concentrated at understanding levels which contained less scientific knowledge than elementary science and physics teacher candidates. However, this statement does not mean that elementary science and physics teacher candidates gave scientific responses at higher rates, but generally the meaningful differences were found between the department and understanding level (See, Table 13). When the levels where the teacher candidates mainly concentrated with respect to their departments, and the reality that astronomy as a topic is a field of elementary science (in the natural sciences) is taken into consideration, it makes sense that the teacher candidates studying in this department will be more knowledgeable of the topic. This situation can be explained because of the interest of elementary science and physics teacher candidates in astronomy topics and also it makes us think that teacher candidates can make more scientific explanations due to the advantages of their fields of study and their numerical and spatial abilities.

The following suggestions can be made in the light of the findings obtained from the study. The teacher candidates' lack of knowledge about astronomy concepts, which are included in the teaching departments, make us think that they will have difficulties during the instruction of these topics in their future professional life. It can be estimated that these difficulties will lead to misconceptions and learning difficulties with the students. Therefore, the teacher candidates must be enabled to realize their deficiencies in the field they majored in and various opportunities about astronomy activities like finding the Sun and a star using Stellarium program, visiting planetarium must be given to the teacher candidates to remove these deficiencies and help them to develop themselves.

The teacher candidates' understanding levels related to the concepts which emerged in the study, and they're not being able to establish relationships at an adequate level between the concepts in the study, reveal that the teacher candidates either memorized the knowledge they acquired about the topic throughout their instruction or they learned superficially. Thus, the individuals must be enabled to learn basic concepts, such as astronomy concepts of the research, meaningfully and permanently throughout their educational life and learning must be a need because attaining the basic concepts plays an important role for the attainment of

other concepts and topics. Therefore, it is suggested that a rich content and learning environment should be provided for the candidates to comprehend astronomy topics and concepts.

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Study on the Technological Pedagogical and Content Knowledge of Teacher Candidates and Their Learning Strategies

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The aim of this paper is to evaluate the Technological Pedagogical and Content Knowledge (TPACK) of teacher candidates, defining the learning strategies of same candidates and researching whether there is relationship between these changes, or not. The research was carried out upon 493 senior class teachers candidate who studied in Necmettin Erbakan University Ahmet Keleşoğlu Faculty of Education in 2011-2012 spring term. The data is acquired by using Technological Pedagogical Content Knowledge Scale and Motivated Strategies for Learning Questionnaire. The data which is acquired from the scales and the information belongs to participants are analyzed with the SPSS (Statistical Package for the Social Sciences) 19.0 packaged software. During the analysis of data, it was used independent-samples t-test, correlation and regression analysis. According to the findings which were obtained from the research, TPACK levels of teacher candidates are occasionally, male candidates' technology, pedagogy and technological content knowledge skills are higher than girls. In the research, it can't be seen that there isn't any significant difference between groups according to score type used for the placement at university in TPACK components, a significant relationship was found between TPACK and learning strategies such as recursion, learning from friend, help search strategies' elaboration, organizing, critical thinking, metacognitive self-regulation, time operation environment monitoring, additionally it was understood that organization and critical thinking strategies predicted the TPACK.

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Introduction

While teacher is trained, the knowledge and the skills that the teachers should have, can be seen in different periods of history and in different quality. It was primarily focused on content knowledge (CK) that the teachers should have. By the mid-1980s, it's began to adopt the idea that it isn't enough to teach content and pedagogical knowledge separately. After that it was added pedagogical knowledge (PCK) on content knowledge (CK) which points out their profession knowledge (Shulman, 1986). Technological pedagogical and content knowledge (TPACK) framework was formed by the addition of technology knowledge (TK) on Shulman's (1986) pedagogical content knowledge (PCK) which means understanding of how to interact with education and technology would be more effective (Koehler & Mishra, 2009).

Nowadays technology knowledge can be integrated into education processes. Teachers are clearly the most important actors for doing the integration of technological education. Therefore qualified teacher should use technology for improving the material in just the same way as they also use technology for planning and preparing the lesson. Moreover, teachers need to have advanced ''Technological and Pedagogical Content Knowledge'' level in order to raise technological literate individuals. It is necessary to identify and enhance ''Technological Pedagogical and Content Knowledge'' level of teachers and to determine the obstacles encountered for increasing these levels.

In this reason we start searching from teacher candidates. In fact, if the teacher candidates see appropriate instructional technologies and the integration in their respective fields of pedagogy they will like to use both technology and pedagogy, and this will help their education for being teacher. It is obvious that there will be many researches on this point. Besides, TPACK researches can be carried out with different research lines. In the subsequent researches, it can be included different variables in order to analyze the effect to teacher candidates (Sahin, 2011).

In this study which analyzes and gathers the data upon the Learning Strategies and TPACK theoretical framework, senior class teacher candidates' technological pedagogical and content knowledge is evaluated according to their gender, and their learning strategies are determined, so we try to find the answers for these questions by analyzing the relation between these variables.

How is TPACK levels of teacher candidates?

Are there any differences of TPACK levels of teacher candidates according to their gender and score type used for the placement at university?

What are the learning strategies of teacher candidates' preferred?

Are there any differences in learning strategies of teacher candidates according to their gender and score type used for the placement at university?

What is the relationship between technological pedagogical and content knowledge with learning strategies for teacher candidates?

Method

In this study, it was researched if there is relation between some variables on TPACK and Learning Strategies of teacher candidates. This research is a survey method because of having described the substantial situation of a group (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2008).

Working Group

Table 1 shows that the distribution of teacher candidates by their gender who participated the research.

Table 1. The Distribution of the Participants by Gender

Gender	*Frequency (f)*	*Percentage (%)*
Female	326	66.1
Male	167	33.9
Total	493	100

From 4th grade students of the faculty of education, totally 493 people participated on our research. One third of participants are male, two out of three are females. The distribution of score type used for the placement of teacher candidates at university is shown at Table 2.

Table 2. The distribution of participants by score type used for the placement at

Score Type	*Frequency (f)*	*Percentage (%)*
Verbal	106	21.5
Quantitative	218	44.2
Equally weighted	169	34.3
Total	493	100

Data Collection Instrument

The Technological Pedagogical and Content Knowledge (TPACK) Scale: Technological pedagogical and content knowledge is a five-point Likert scale which is consisting of totally 47 substances and seven sub-dimensions. Scale was developed by Sahin (2011), the validity and reliability of it has been proven. The answers of five point Likert scale are '1= I never know', '2= I know minimum level', '3= I know medium level', '4= I know well', and '5= I know very well'. The scale consists of seven sub-dimensions. Respectively these dimensions are; technology knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK) and technological pedagogical and content knowledge (TPACK).

The Learning Strategies Scale: It was developed in 1991 and validity, reliability of it has been proven by Pintrich, Smith, García, and McKeachie (1993). We used Turkish version of this scale which was customized by Altun and Erden (2006) because of working group. Scale was organized from 81 substances as seven-point Likert, it was used as cognitive and metacognitive strategies and resource management strategies which consists of 50 substances in 'Motivated Strategies for Learning Questionnaire'. The sub-dimensions are as follows. Recursion, elaboration, organizing, critical Thinking, metacognitive self-regulation, time and operation management, environment monitoring, regulation of effort, learning from friend, help search.

Data Analysis

The data obtained from the scale and information about participants were analyzed by SPSS 19.0 (Statistical Package for the Social Sciences) package program. First we create score groups to evaluate the scores obtained from TPACK and Learning Strategies scale. TPACK ranking scores were divided into 5 groups is shown at table 3.

Table 3. Rating groups of TPACK score averages

	never	*rarely*	*occasionally*	*often*	*always*
TK	15 - 26.9	27–38.9	39-50.9	51-62.9	63-75
PK	7 - 12.9	13-17.9	18-23.9	24-28.9	29-36
CK	6 – 10.9	11-15.9	16-20.9	21-24.9	25-30
TPK	4 – 6.9	7 – 9.9	10-13.9	14-16.9	17-20
TCK	4 – 6.9	7 – 9.9	10-13.9	14-16.9	17-20
PCK	7 - 12.9	13-17.9	18-23.9	24-28.9	29-36
TPACK	6 – 10.9	11-15.9	16-20.9	21-24.9	25-30

The Learning Strategies scale ranking were also divided into 5 groups is shown at table 4.

Table 4. Rating Groups of Learning Strategies Score Averages

	never	*rarely*	*occasionally*	*often*	*always*
Recursion	4 - 8.8	8.9-13.6	13.7-18.4	18.5-23.2	23.3-24
Elaboration	6 - 14.4	14.5-22.8	22.9-31.2	31.3-39.6	39.7-48
Organizing	4 - 8.8	8.9-13.6	13.7-18.4	18.5-23.2	23.3-24
Critical Thinking	5 - 10.9	11-15.9	17-22.9	23-28.9	29-35
Metacognitive self-regulation	12 - 26.3	26.4-40.7	40.8-55.1	55.2-69.5	69.6-84
Time Operation Environment Monitoring	8 - 17.5	17.6-27.1	27.2-36.7	36.8-46.4	46.5-56
Regulation of Effort	4 - 8.8	8.9-13.6	13.7-8.4	18.5-23.2	23.3-24
Learning from Friend	3 - 6.5	6.6-10.1	10.2-13.7	13.8-17.3	17.4-21
Help Search	4 - 8.8	8.9-13.6	13.7- 18.4	18.5-23.2	23.3-24

After that T-Test were analyzed to find any significant difference in sub-dimensions of scales among male and female prospective teachers. Analysis of variance (one way anova) were explained to determine whether differences in TPACK and Learning Strategies' scores of teacher candidates according to the score type used for the placement at university. Correlation values were calculated to understand relationship between TPACK and Learning Strategies of teacher candidates and regression analyzed to find the learning strategies that predicting the TPACK scores of teacher candidates. In this search the level of significance was adopted as p=.05.

Findings

TPACK and its sub-dimensions score for the evaluation of teacher candidate is shown in Table 5.

Table 5. TPACK level of teacher candidates

	$\overline{X}$	*S*	*Minimum*	*Maximum*
TK	51.46	11.222	15	75
PK	20.54	4.566	8	30
CK	20.67	4.158	10	30
TPK	14.15	3.083	6	20
TPK	13.75	3.036	5	20
PCK	25.22	4.720	10	35
TPACK	17.42	3.876	5	25

When table 5 is analyzed, at the sub-dimension of TPACK scale we can't be seen that there is no "*never*" and "*rarely*" level according to table 3. Pedagogical knowledge (PK), content knowledge (CK), technological content knowledge (TCK), technological pedagogical and content knowledge (TPACK) levels are "*occasionally*"; technological knowledge (TK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK) levels are "*often*" according to table 3.

The scores of teacher candidates from TPACK scale that the distribution by gender is shown at Table 6.

Table 6. A comparison of TPACK components in reference to gender

	Gender	*N*	$\overline{X}$	*S*	*t*	*p*
TK	Female	326	49.55	10.345	-5.432	0.000*
	Male	167	55.19	11.940		
PK	Female	326	20.22	4.465	-2.146	0.032*
	Male	167	21.15	4.709		
CK	Female	326	20.45	4.027	-1.686	0.092
	Male	167	21.11	4.382		
TPK	Female	326	13.95	2.969	-2.031	0.043*
	Male	167	14.54	3.267		
TCK	Female	326	13.47	2.928	-2.969	0.003*
	Male	167	14.32	3.170		
PCK	Female	326	24.98	4.728	-1.557	0.120
	Male	167	25.68	4.684		
TPACK	Female	326	17.21	3.677	-1.752	0.080
	Male	167	17.85	4.215		

**: p<.05*

It can be understood from Table 6, it was found significant difference in sub-dimensions among male and female teacher candidates; Technological knowledge (t = -5.432), pedagogical knowledge (t = -2.146), technological pedagogy knowledge (t = 2.712), technological content knowledge (t=-2.969). From the group average and standard deviations, in sub-dimensions of technological knowledge, pedagogical knowledge, technological pedagogy knowledge and technological content knowledge, there is statistically significant difference between male and female teacher candidates which is in favor of male teacher candidates. The knowledge level of male teacher candidates on these four components is higher when compared with female teacher candidates. There isn't any statistically significant

difference between male and female teacher candidates on the other three knowledge level.

Table 7. The one way analysis of variance (Anova) results according to score type used for the placement at university

		Sum of Squares	*Degree of freedom*	*Mean Square*	*F*	*p*
TK	Between Groups	1388.14	2	694.072	5.615	0.004*
	Within Groups	60568.41	490	123.609		
	Total	61956.56	492			
PK	Between Groups	48.19	2	24.093	1.156	0.315
	Within Groups	10208.44	490	20.834		
	Total	10256.63	492			
CK	Between Groups	65.93	2	32.964	1.914	0.149
	Within Groups	8440.49	490	17.225		
	Total	8506.42	492			
TPK	Between Groups	13.85	2	6.926	0.728	0.483
	Within Groups	4661.74	490	9.514		
	Total	4675.59	492			
TCK	Between Groups	36.19	2	18.094	1.971	0.140
	Within Groups	4499.11	490	9.182		
	Total	4535.30	492			
PCK	Between Groups	27.30	2	13.648	0.612	0.543
	Within Groups	10933.91	490	22.314		
	Total	10961.21	492			
TPACK	Between Groups	2.44	2	1.218	0.081	0.922
	Within Groups	7387.96	490	15.077		
	Total	7390.40	492			

*: p <.05

Analysis of variance (one way anova) results were shown in table 7 to determine whether differences in TPACK and Learning Strategies' scores of teacher candidates according to the score type used for the placement at university. When table 7 is analyzed, except technological knowledge (TK), it can't be seen that there isn't any significant difference between groups according to score type used for the placement at university in TPACK components. The significant difference level is p<.05 at technological knowledge (TC) of tacher candidates. To understand which score type is better at technological knowledge that the results of the scheffe test are shown at Table 8.

Table 8. The scheffe test results according to score type used for the placement at university

	Score type		*Mean difference*	*Standard error*	*p*
TC	Verbal	Equally weighted	-2.636	1.316	0.136
		Quantitative	**-4.608***	**1.378**	**0.004***
	Equally weighted	Quantitative	-1.972	1.139	0.225
PC	Verbal	Equally weighted	-0.388	0.540	0.773
		Quantitative	-0.842	0.566	0.331
	Equally weighted	Quantitative	-0.454	0.468	0.625
CK	Verbal	Equally weighted	-0.128	0.491	0.967
		Quantitative	0.677	0.514	0.421
	Equally weighted	Quantitative	0.805	0.425	0.168
TPC	Verbal	Equally weighted	-0.259	0.365	0.777
		Quantitative	0.111	0.382	0.959
	Equally weighted	Quantitative	0.370	0.316	0.504
TCK	Verbal	Equally weighted	-0.707	0.359	0.144
		Quantitative	-0.408	0.375	0.554
	Equally weighted	Quantitative	0.299	0.311	0.629
PCK	Verbal	Equally weighted	-0.591	0.559	0.573
		Quantitative	-0.250	0.585	0.913
	Equally weighted	Quantitative	0.340	0.484	0.781
TPACK	Verbal	Equally weighted	0.020	0.460	0.999
		Quantitative	-0.134	0.481	0.962
	Equally weighted	Quantitative	-0.154	0.398	0.928

*:p <.05

When table 8 is analyzed, there is a significant difference in terms of technology knowledge (p<.05) among verbal and quantitative score type in favor of quantitative teacher candidates.

Learning strategies' score mean, standard deviation, the lowest and highest values for the evaluation of teacher candidate is shown in Table 9.

Table 9. The learning strategies' level of teacher candidates

	$\overline{X}$	*S*	*Minimum*	*Maximum*
Recursion	14.17	3.430	4	21
Elaboration	30.34	6.171	11	42
Organizing	20.19	4.434	5	28
Critical thinking	23.44	5.083	8	35
Metacognitive self-regulation	56.57	9.785	24	82
Time operation environment	36.25	6.346	15	56
Regulation of effort	16.74	3.815	4	28
Learning from friend	12.28	3.940	3	21
Help search	18.20	4.176	6	28

When table 9 is analyzed it can be seen that recursion, time operation environment, learning from friend, help search strategies of teacher candidates are "occasionally"; elaboration, organizing, critical thinking and metacognitive self-regulation strategies are "often" according

to table 4. The distribution of teacher candidates for learning strategies according to their gender is given in Table 10:

Table 10. Comparison of learning strategies in reference to gender

	Gender	*N*	$\overline{X}$	*S*	*t*	*p*
Recursion	Female	326	14.39	3.377	1.923	0.055
	Male	167	13.76	3.506		
Elaboration	Female	326	30.79	5.992	2.270	0.024*
	Male	167	29.47	6.433		
Organizing	Female	326	20.60	4.409	2.872	0.004*
	Male	167	19.40	4.389		
Critical Thinking	Female	326	23.28	5.063	-1.014	0.311
	Male	167	23.77	5.121		
Metacognitive self-regulation	Female	326	56.74	9.493	0.559	0.576
	Male	167	56.22	10.352		
Time Operation Environment Monitoring	Female	326	36.40	6.044	0.734	0.463
	Male	167	35.96	6.908		
Regulation of Effort	Female	326	16.64	3.889	-0.790	0.430
	Male	167	16.93	3.671		
Learning from Friend	Female	326	12.12	4.029	-1.271	0.204
	Male	167	12.59	3.753		
Help Search	Female	326	18.23	4.273	0.187	0.852
	Male	167	18.16	3.992		

**: p<.05*

When Table 10 is analyzed, it can be seen that there isn't any significant difference by their gender on the learning strategies such as recursion, elaboration, organizing, critical thinking, metacognitive self-regulation, time and operation management, environment monitoring, regulation of effort, learning from friend and help search that the teacher candidates used. But

When we look at elaboration extent the average score of female participants are 30.79, and standard deviation is 5.99 while the average point of male participants 29.47 and standard deviation is 6.43. It was made a t test to understand if there is significant difference between male and female teacher candidates on using learning strategies. As a result of the t test, a significant difference was found on using elaboration strategies between male and female teacher candidates (t=2.27; p<.05). It can be said that female teacher candidates are using elaboration learning strategies more frequently than male teacher candidates.

When we look at organizing dimension, the average point of female participants is 20.60; standard deviation is 4.41, meanwhile the average point of male participants is 1.40 and standard deviation is 4.39. It was found a significant difference between male and female teacher candidates on using organizing strategies (t=2.87; p<.05). It can be mentioned that female teacher candidates are using organizing learning strategies more often.

Table 11. Correlation Values between TPACK and Learning Strategies

Learning Strategies	*TPACK*
Recursion	0.247**
Elaboration	0.392**
Organizing	0.379**
Critical Thinking	0.378**
Metacognitive self-regulation	0.405**
Time ,Operation Environment Monitoring	0.333**
Regulation of Effort	0.067
Learning from Friend	0.226**
Help Search	0.249**

***: p<.01*

The relation between TPACK and learning strategies is analyzed. The Pearson correlation coefficients are given at Table 11. When the correlation coefficients are analyzed, it can be seen that except regulation of effort, there are correlations between learning strategies and TPACK of teacher candidates such as recursion, learning from friend and help search strategies' correlation coefficients are at little level and elaboration, organizing, critical thinking, metacognitive self-regulation, time operation environment monitoring strategies' correlation coefficients are "middle" level. İf we want to learn which learning strategies predict the TPACK. The results of the regression analysis are shown at Table 12 in order to find the learning strategies that predicting the TPACK scores of teacher candidates.

Table 12. The Results of Regression Analysis on Predicting TPACK Scores According to Learning Strategies of Teacher candidates

Independent Variables	*Standard Points*		*Standardized Points*		
	B	*SH*	*Beta*	*t*	*p*
Invariant	97.454	7.785		12.518	0.000
Recursion	-0.252	0.401	-0.031	-0.629	0.530
Elaboration	0.095	0.339	0.021	0.281	0.779
Organizing	1.253	0.395	0.201	3.171	0.002*
Critical Thinking	0.863	0.385	0.158	2.240	0.026*
Metacognitive self-regulation	0.268	0.222	0.095	1.205	0.229
Time, Operation Environment Monitoring	0.208	0.238	0.048	0.876	0.381
Regulation of Effort	-0.517	0.340	-0.071	-1.520	0.129
Learning from Friend	0.275	0.355	0.039	0.776	0.438
Help Search	0.193	0.357	0.029	0.540	0.589

*R= 0.46 R^2 = 0.21 F= 14.21 **: p<.01 *: p<.05*

When Table 12 is analyzed, using only organizing and critical thinking strategies can explain the %21 percentage of TPACK. When examining the parameters of the regression model, according to standardized regression coefficient (Beta), it can be seen that predictor variables have the relative order of importance on TPACK; organizing, critical thinking, metacognitive self-regulation, time operation and environment monitoring, learning from friend, help search, elaboration, recursion and regulation of organizing effort. It was understood that organizing ($t=3.171$; $p<.05$) and critical thinking ($t=2.240$; $p=<.05$) from independent variables, are one of the important predictor. As a result of the regression analysis, there wasn't any predictor characteristic of recursion and regulation of organizing effort.

Discussion

Teacher candidates are mostly using metacognition, managing the cognition and affective strategies. Female participants are using elaboration and organizing strategies more often. The use of learning strategies - recursion, critical thinking, metacognitive self-regulation, time and operation management, environment monitoring, regulation of effort, learning from friend and help search are very close between male and female participants. The knowledge level of male teacher candidates on technological knowledge, pedagogical knowledge, technological pedagogic knowledge and technological content knowledge from TPACK, is higher than female teacher candidates.

There is middle level of relation between the learning strategies which teacher candidates use (organizing, critical thinking, metacognitive self-regulation, time operation environment monitoring strategies' correlation coefficients) and the technological pedagogic content knowledge level. Organizing and critical thinking strategies can explain the %21 percentage of TPACK levels of teacher candidates.

As a result of this research, teacher candidates use learning strategies as intense. These findings in our research are similar to research in order to determine the learning strategies that teacher candidates use when working by Yüksel and Koşar (2001).

Öztürk (1995) examined the case of learning strategies used by university students and find that university students were using the most metacognitive self-regulation strategies and the least recursion strategy similar to our study.

When we look at the survey by Karakış and Çelenk (2007) to determine the level of use of students' learning strategies studying in different faculties can be seen that metacognitive self-regulation strategies were used often by students.

In the research by Altun (2005) using with the same scale find that the score means of metacognitive self-regulation, time operation environment monitoring, regulation of effort, help research strategies were 49.4, 35.4, 18.6, 18.5 and close to this study score means which are 56.57, 36.25, 16.7, 18.2. When Altun (2005) study is analyzed female participants' regulation of effort strategies and male participant's metacognitive self-regulation, time operation environment monitoring strategies are predicting their success. Female's strategies of elaboration and organizing are significantly different from male participants just like our research findings.

In the study by Şahin and Çakar (2011) with the 240 4th grade students from faculty of

education participated was found that significant difference in terms of recursion, elaboration, organizing, metacognitive self-regulation strategies in favor of female participants. In our research significant difference was found at only elaboration and organizing strategies between male and females.

When we look at the survey with 291 third and fourth grade teacher candidates by Nurten, Sağırlı, İhsan, and Kaşkaya (2009) using with the same scale find that significant difference in terms of elaboration, organizing strategies in favor of female participants. This findings are similar to our research.

At the study by Saban and Tümkaya (2008) with 230 4th grade student from primary teaching we can be seen that significant difference at learning strategies' sub-dimensions in favor of female participants. These strategies help search, metacognitive self-regulation, time operation environment monitoring. If we look our findings we will also see significant difference at learning strategies' sub-dimensions in favor of female participants.

If we look at other findings of this research we will see significant difference at time operation environment monitoring, regulation of effort strategies according to score type used for the placement at university but we can't see any differences at other sub-dimension of learning strategies. At the study by Karakış and Çelenk (2007) with the students from different faculties there isn't any significant difference at learning strategies in terms of faculties.

If we discuss about TPACK, Timur and Taşar (2011) were found in their research that technology knowledge (TC) of teacher candidates has advanced but not enough to integrate the technology into pedagogical knowledge because of lack of experience.

In the research by Canbolat (2011) with 143 4th grade students from the department of mathematics teachers faculty of education and using with the same scale find that the score means of TPACK (TC, PK, CK, PCK, TPK,TCK TPACK) were 46.34, 19.09, 20.48, 23.81, 13.01, 11.84, 15.83 and except technology knowledge close to this study score means of TPACK (TK, PK, CK, PCK, TPK,TCK TPACK) which were 51.46, 20.54, 20.67, 25.22, 14.15, 13.75 and 17.42. In that study there is statistically significant difference at TK, TPK, TCK and TPACK in favor of male participants similar to our study that we have found significant difference at TK, TPK, and TCK.

It was understood that the participants whose TPACK level are generally occasionally, they use learning strategies often at least. It can also be provided training for male participants to use their learning strategies more efficiently. It can be done researches about the reasons why female participants are using organizing and elaboration strategies more frequent than male participants. Organizing and critical thinking strategies predicting the TPACK. It should be taken proper steps to improve their technological knowledge. It should be carried out works or studies in order to improve the TPACK levels of teacher candidates. Similar researches should be carried out for teachers as well.

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Cross-Gender Equivalence of Cyber Bullying and Victimization

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This study aims to investigate the cross-gender equivalency of cyber bullying and victimization across gender using Revised Cyber Bullying Inventory (RCBI). Because gender differences may have a strong effect on measurement inequalities, tests of measurement invariance were conducted to ensure that the scores obtained from cyber bullying and victimization forms of RCBI were generalizable between males and females. The samples for this study consisted of 217 females and 235 males. The measurement invariance of the cyber bullying and victimization forms of RCBI was examined with multiple group confirmatory factor analysis (MG-CFA). For the test of MG-CFA, a set of confirmatory factor analysis procedures were utilized. In order that collate relative fit of nested models across gender, change in CFI (comparative fit index) was utilized here, with a suggestion that support for the more parsimonious model can fit data better than a less parsimonius model requires a change in CFI is smaller or equal to .01. Confirmatory factor analyses were conducted using LISREL. MG-CFA results showed that there were not enough evidence to support the measurement invariance of the cyber bullying and victimization forms of RCBI across gender at a scale level. Results were discussed in the light of the literature.

1. Introduction

Bullying is often depicted as being an aggressive, intentional act or behavior that is done by individual or group repeatedly in order to humiliate victims who are inferior them,

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either physically or psychologically (Olweus 1999). With the rapid growth of communication and information technology, cyberspace has been implicated as a new risky environment for bullying. This new form of bullying called cyber bullying refers to bullying by the means of information and communication technologies such as emails, text messages, and web sites (Kowalski, Limber & Agatston 2008). Cyber bullying is also delineated as repeated hostile behavior of an individual or a group toward another individual through communication technologies such as e-mail, cell phone, SMS, instant messaging, personal web sites, and blogs. Other terms may refer to cyber bullying include online bullying, e-bullying, digital bullying, internet bullying, and cyber harassment (Kowalski et al. 2008). Cyber bullying varies in forms and by means. Arıcak and colleagues (2008) stated that cyber bullying includes online behaviors such as lying, hiding the identity, introducing oneself as someone else, threatening, teasing, insulting, defamation, intimidation, rumor, and displaying others' pictures without their consent in cyberspace.

Researches about cyber bullying indicate that cyber victims suffer academic problems such as absenteeism (Katzer, Fetchenhauer & Belschak 2009) and lack of concentration (Beran & Li 2007), and mental health problems such as depression (Ybarra, Alexander & Mitchell 2005), social anxiety (Juvonen & Gross 2008), low self-esteem (Katzer et al., 2009), substance use (Ybarra & Mitchell, 2004), helplessness (Hinduja & Patchin 2008), tendency to violate school rules (Ybarra, Diener-West & Leaf 2007).

Cyber bullies suffer psychological problems as well as cyber victims. Cyber bullies feel extremely anger for no reason (Pornari & Wood 2010) and feel hostility towards others (Arıcak 2009). Consequently, cyber bullies and cyber victims suffer from, and are at risk of mental health problems. Another significant point addressed in the researches is gender differences in cyber bullying and cyber victimization. Because cyber bullying has been considered as a part of relational bullying (Keith & Martin 2005), researchers have found that females engage in cyber bullying more than males. However, researches in Turkey (Arıcak et al., 2008; Dilmaç 2009; Erdur-Baker 2010; Erdur-Baker & Kavşut 2007; Peker, Eroğlu & Çitemel 2012) challenge the claim that girls are more likely to engage in cyber bullying.

It is seen that gender differences in cyber bullying and cyber victimization have typically been based on studies utilizing a mean difference method. From a measurement perspective, this method is inherently problematic unless cyber bullying and cyber victimization scales possesses comparable validity across gender. Stated differently, establishing measurement invariance on the measures of cyber bullying and cyber victimization is prerequisite to making any inferences about gender differences (Kim, Kim & Kamphaus 2010). For this reason, whether cyber bullying and cyber victimization operates in the same way across gender is investigated using Revised Cyber Bullying Inventory (RCBI) in this study. Therefore, the issue of whether or not both cyber bullying and cyber victimization forms of RCBI are unbiased in relation to gender is assessed by multi-group confirmatory factor analysis (MG-CFA) which allows for the testing of a hypothesized factor structure in different groups simultaneously (MacCallum & Austin 2000; Rijkeboer & Bergh 2006). The reason of choosing RCBI as measurement tool is because it has largely utilized to determine gender differences in cyber bullying and cyber victimization (Çetin, Eroğlu, Peker, Akbaba & Pepsoy 2012; Erdur-Baker & Tanrıkulu 2009; Eroğlu 2011; Eroğlu, Çetin, Güler, Peker & Pepsoy 2011; Mura, Topçu, Erdur-Baker & Diamantini 2011; Topçu & Erdur-Baker 2011) among cyber bullying and victimization scales (Akbulut & Erişti 2011; Akbulut, Şahin & Erişti 2010; Çetin, Yaman & Peker 2011).

Measurement invariance involves testing the equivalence of measured constructs in two or more independent groups to assure that the same constructs are being assessed in each group (Chen, Sousa, & West 2005). From this perspective, it can be claimed that whether the underlying construct has the same theoretical structure across gender is given great attention in psychology. For example, considering moral reasoning, Gilligan (1997) claimed that men and women differ in their moral reasoning, so women consider ethic of care which highlights the interdependence of individuals as opposed to men who use ethic of justice which places on individual autonomous choice and equality (as cited in Akbaba 2009).

Measurement invariance is achieved when parameters of the measurement model are equivalent across groups (Tucker, Ozer, Lyubomirsky & Boehm 2006). Methods which aim to test measurement invariance in the framework of EFA (explanatory factor analysis) focus only on similarity of factor patterns across groups. In contrast, testing for measurement invariance of CFA (confirmatory factor analysis) models addresses the configural invariance, metric invariance, scalar invariance, and the strict invariance of the model (Cheung & Renswold 2002; Dimitrov 2010).

Configural invariance is defined as the same pattern of fixed and free factor loadings (and other parameters) across groups, but no equality constraints. The model of configural invariance serves as a useful baseline model to which researchers can compare more restrictive models (Meredith & Teresi 2006). Criteria for metric measurement invariance are that equivalence of factor loadings across groups. Equivalence of factor loadings demonstrates that the latent variable is related to items in the same way across groups. Establishing equivalence at this level is importance because each item that is chosen to measure a latent variable should equally measure that latent variable across groups. Scalar invariance required equivalence of item intercepts across groups as well as equivalence of factor loadings. Item intercepts are the assets of the indicator scores when the latent variable is zero (Bayram 2010). Under scalar invariance, the comparison of factor groups is permissible.

The lack of equivalence of item intercepts across groups indicates the presence of item bias (Dimitrov 2010; Tucker et al. 2006). To compare group means on manifest variables, scalar invariance must be established (Tucker et al. 2006). A strict level of measurement is required equal factor loadings, equal item incepts, and equal item uniqueness (error variances and covariances) across groups. The invariance of item uniqueness across groups provides evidence that the items were measured with the same precision in each group. Meeting the criteria of strict measurement invariance indicates group differences on any item stem from entirely group differences on the common factors (Dimitrov 2010). Establishing measurement invariance involves a hierarchy of these stages as one will be the prerequisite for upper stage. In the event of testing measurement invariance, the first stage is to test for configural invariance that is to fit a baseline model for each group separately. The second step is to test for metric invariance using the data for all groups simultaneously in order to obtain more efficient parameter estimates. These two steps must precede testing for scalar invariance respectively (Dimitrov 2010). Last, to analyze strict invariance, configural, metric, and scalar invariance should be examined respectively and revealed (Güzeller 2011; Uzun & Öğretmen 2010).

2. Method

Research Design

The current study utilized a descriptive design, supported by the measurement theory and psychometric theory (Nunnally & Bernstein, 1994) to cross gender validate the cyber bullying and victimization. Psychometric equivalency was inquired by examining the measurement invariance across gender.

Study Group

Participants were 452 (217 (48 %) were female and 235 (52 %) were male) high school students from different high schools in Bursa. Their ages ranged from 15 to 18 (M=16.39, SD=1.002).

Instruments

Revised Cyber Bullying Inventory [RCBI; 40] consists of 28 items, 14 of which are in cyber bullying form and 14 of which are in cyber victimization form. For each item, participants indicate their response using a 4-point likert type scale ranging from 1 (none) to 4 (more than three times). Exploratory factor analysis revealed that items in cyber bullying form loaded one factor loadings of items varied from .28 to .83. Confirmatory factor analysis showed that the model contained one factor was well fit. Goodness of fit indices were found as GFI=.93, AGFI=.89, CFI=.93, NFI=.89, TLI=.90, and RMSEA=.06. Like cyber bullying form, cyber victimization form includes a single factor and factor loadings of items in this form varied between .21 and .78. Confirmatory factor analysis showed that the model contained one factor was well fit and chi-square value (χ^2/df=1.85) was significant. Goodness of fit indices were found as GFI=.93, AGFI=.90, CFI=.89, NFI=.84, TLI=.86, and RMSEA=.06. For criterion-related validity, relationship between cyber bullying and traditional bullying was calculated as .45. Similarly, relationship between cyber victimization and traditional victimization was found as .36. The more individual's score in RCBI increase, the more cyber bullying experiences increase. Similarly the more individual's score in RCBI increase, the more cyber victimization experiences increase.

Procedures

Data were collected during the fall semester of the 2014 school year. After obtaining school authority's permission from these five schools, a demographics form and RCBI were administered to the students during regular class time. The entire survey process, including informed consent, required approximately 10 minutes. The survey applied anonymously and all completed data were maintained in a secure location.

Data Analysis

To test for the measurement invariance of cyber bullying and cyber victimization form of RCBI, several multiple-group confirmatory factor analyses were conducted using LISREL 8.54 (Jöreskog & Sorbom 1996). The items of cyber bullying and cyber victimization form of RCBI were treated as continuous variables and the maximum likelihood estimation (ML) were used both confirmatory and multi-group confirmatory factor analysis because the data were multivariate normally distributed. Moreover, the skewness and kurtosis estimates divided by the standard error all not exceeded a z-score of 1.96 and indicated the data were normally distributed thereby reinforcing the selection of the ML estimator for invariance analysis.

Confirmatory factor analyses were used to examine the dimensional structure of the cyber bullying and cyber victimization form of RCBI in females and males sample simultaneously. Covariance matrix was adopted as input. Several goodness-of-fit indices were used to evaluate the fit of the models to the data, including chi-square/degree of freedom (χ^2/df), root mean square error of approximation (RMSEA), comparative fit index (CFI), and non-normed fit indices (NNFI). For χ^2/df, values ≤ 2 indicate perfect fit, values ≤ 5 indicate acceptable fit. The CFI and NNFI, vary along a 0-to-1 continuum, in which values greater than .90 and .95 are taken to indicate acceptable and perfect fits to the data, respectively. In relation to RMSEA indices, values $\leq$ .08 demonstrate acceptable fit, and values $\leq$ .05 demonstrate excellent fit (Hu & Bentler 2004; Kline 2005).

To investigate whether the aspects of factor structure would systematically hold invariant across females and males, analyses were done by hierarchically nesting the models to conduct systematic comparison test (Vandenberg & Lance 2000; Huang, Zhou, Wang & Zhang 2010). Namely, testing for factorial invariance of confirmatory factor analysis is substantiated by testing sequence of models, beginning with an unconstrained model and progressively introducing equality constraints on parameters (Vandenberg & Lance 2000). The following hierarchical ordering of nested models was tested to reflect the relative importance of the different sets of parameters: (a) unconstrained model, (b) factor loadings invariant, (c) factor loadings and error variances invariant across groups, (d) factor loadings, error variance and factor correlations invariant (Brown 2006; Çetin 2010; Şekercioğlu 2010; Wang, Willett & Eccles 2011).

In order to compare relative fit of nested models, change in CFI (Δ CFI) was used here, with a recommendation that support for the more parsimonious model (the more highly constrained model with fewer estimated parameters) can fit data better than a less parsimonious model requires a change in CFI is smaller or equal to .01 (Cheung & Rensvold 2002).

3. Results

Table 1 demonstrates the reliabilities within each sample for cyber bullying and cyber victimization form. Both cyber bullying and cyber victimization forms displayed highly satisfactory internal consistencies in each gender. Cyber bullying form appeared to have higher reliabilities than cyber victimization form in each gender.

Table 1. Reliabilities (Cronbach's Alpha) of Cyber Bullying and Cyber Victimization Forms in Each Gender

Gender	cyber victimization	cyber bullying
Male	.83	.86
Female	.82	.85

Firstly, confirmatory factor analysis was done using total group sample (N=452), consists males and females, as a preliminary both cyber victimization and cyber bullying forms of RCBI. For cyber victimization form, this a priori model did not provide acceptable goodness of fit indices, in accordance with current proposed standards. Therefore, the modification indices suggested a substantial improvement in fit associated with freeing the correlation of the error variance between item 1 and item 6, item 2 and item 14, item 3 and item 11, item 3 and item 5, item 4 and item 5, item 4 and item 6, item 4 and item 12, item 6 and item 8, item 7 and item 14, item 7 and item 9, item 9 and item 13, item 10 and item 11, item 11 and item 13 (Bayram 2010; Huang et al. 2010). The model fit was significantly improved after using

modification indices. The overall fitness indices of modified model were χ^2/df=2.24, RMSEA=.053, CFI=0.98, NNFI=0.97, which indicates that the model was excellent fit. The fit indices of model with and without modification indices are presented in Table 2. For cyber bullying form, this initial model did not show acceptable fit to the data and substantially improved using modification indices between the errors of item 1 and item 11, the errors of item 2 and item 9, the errors of item 3 and item 4, the errors of item 3 and item 9, the errors of item 6 and item 9, the errors of item 6 and item 13, the errors of item 8 and item 9, the errors of item 9 and item 11, the errors of item 10 and item 11, the errors of item 10 and item 13, the errors of item 11 and item 12, the errors of item 12 and item 14. There was not acceptable fit with the initial model, but the goodness-of-fit indices of the respecified model improved excellently with respect to goodness-of-fit indices of the initial model (see Table 2). Secondly, a priori model to fit data separately, for each of males and females with no invariance constraints, were tested.

Table 2. Goodness-of-fit-indices for Different Models in Total, Male, and Female Samples for Cyber Victimization and Cyber Bullying

Models	χ^2/df	RMSEA (90 % CI)	CFI	NNFI
CV				
Total sample				
Initial model	8.91	0.13 (0.12;0.14)	0.83	0.80
Modified model	2.24	0.053 (0.041; 0.064)	0.98	0.97
Male sample				
Initial model	3.003	0.122(0.10;0.14)	0.85	0.82
Modified model	1.91	0.079(0.061;0.10)	0.93	0.91
Female sample				
Initial model	7.19	0.14(0.13;0.15)	0.85	0.82
Modified model	1.83	0.052(0.036;0.067)	0.98	0.97
CB				
Total Sample				
Initial model	6.90	0.11 (0.11;0.12)	0.91	0.89
Modified model	2.45	0.057(0.046;0.068)	0.98	0.97
Males				
Initial model	3.50	0.137(0.12;0.15)	0.86	0.84
Modified model	1.77	0.076(.053;0.098)	0.96	0.94
Females				
Initial model	7.40	0.14 (0.13;0.15)	0.87	0.84
Modified model	2.27	0.063(0.049;0.078)	0.98	0.97

Note: CV=Cyber Victimization; CB=Cyber Bullying; CI=Confidence Interval; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; NNFI=Non-Normed Fit Indices; χ^2/df= chi-square/degree of freedom ratio

As seen in Table 2, initial CFA models for cyber bullying did not have acceptable fit in males and females as well as initial CFA models for cyber victimization. Therefore, the initial models for cyber bullying and cyber victimization in both males and females were improved by correlating error variances as recommended by the all modification indices, and then it was seen that the modified CFA models of cyber bullying and cyber victimization in both of genders were well fit in relation to previously mentioned standards for acceptable fit.

Table 3 summarizes the results of measurement invariance of the model across genders for cyber victimization. Evaluating measurement invariance was started with the baseline model, in which all parameters are free across gender (Model 1 in Table 3). Model 1 is vital, because all other models with invariance constrained, are nested under this model. So Model 1 gives a crucial starting point, for comparing the influence of other invariance constraints. If it will

result that a more parsimonious solution with invariance constraints is able to fit the data, there is support for the invariance constraints (Çetin 2010). The baseline model did not yield an acceptable absolute fit, implying that configural invariance of the model does not hold across genders. Hence testing for model invariance which involves using the forward sequential procedures described in introduction is not conducted.

Table 3. Goodness of Fit in Confirmatory Factor Model across Gender for Cyber Victimization

MODEL	χ^2/df	RMSEA (90 % CI)	CFI	NNFI	Δ CFI
Model 1[a]	15.05	0.19(0.18; 0.20)	0.78	0.74	
Model 2[b]	12.71	0.20(0.19; 0.21)	0.74	0.71	-.03
Model 3[c]	14.62	0.21(0.21;0.22)	0.68	0.68	-.06
Model 4[d]	14.55	0.21(0.21; 0.22)	0.68	0.68	-.06

Note:[a] Unconstrained [b] Factor Loadings Invariant [c] Factor Loadings and error variances Invariant [d] Factor Loadings, error variances and factor correlations invariant.

Table 4 contains the fit statistics for the four nested models and indicates that CFA in each group did not provide evidence of configural invariance for boys and girls. Thus further testing was not performed. Because evidence of configural invariance is prerequisite for measurement invariance, further testing is not appropriate if configural invariance does not hold (Cheung & Rensvold 2002).

Table 4. Goodness of Fit in Confirmatory Factor Model Across Gender for Cyber Bullying

MODEL	χ^2/df	RMSEA (90 % CI)	CFI	NNFI	Δ CFI
Model 1[a]	7.31	0.15(0.14; 0.15)	0.83	0.79	
Model 2[b]	7.82	0.15(0.14; 0.16)	0.80	0.78	-.03
Model 3[c]	15.67	0.22(0.21;0.23)	0.32	0.32	-.51
Model 4[d]	15.40	0.22(0.21; 0.23)	0.31	0.31	-.52

Note:[a] Unconstrained [b] Factor Loadings Invariant [c] Factor Loadings and error variances Invariant [d] Factor Loadings, error variances and factor correlations invariant.

4. Discussion and Conclusion

In this study, the cross-gender measurement invariance of cyber bullying and cyber victimization form of RCBI were examined. Accordingly, first of all, CFAs were conducted with total sample as well as each gender separately. In this study, the results of study indicated that neither models of cyber bullying nor of cyber victimization show well fit in female, male and total samples on all fit indices except for CFI in boy's group exceeding the cut-off value of .90. Therefore models of cyber bullying and cyber victimization in female, male, and total sample substantially were improved by using modification indices only when suggested modifications are valid conceptually. After that internal consistency coefficients were calculated for both cyber bullying and cyber victimization forms by gender separately. Results showed that both cyber bullying and cyber victimization forms yielded satisfactory reliability coefficients.

An important feature of this research is examination of the cross-gender measurement invariance of the cyber bullying and cyber victimization forms of RCBI. For this purpose, four different CFA models were used, ranging from an unconstrained model to most constrained model, in terms of parameter estimations. In addition to the foregoing, there are

some general constraints which are common for these four models, such as item intercepts, associated with each item, were not allowed to be correlated with item intercepts for any other items (Çetin 2010). Tests of measurement invariance began with testing configural invariance both for cyber bullying and cyber victimization forms of RCBI and the baseline models of cyber bullying and cyber victimization testing configural invariance of the proposed model did not show acceptable fit. This means that it can be said that unconstrained models of cyber bullying and cyber victimization failed to meet criteria for adequate goodness of fit indices, indicating that a one-factor model for cyber bullying and cyber victimization forms of RCBI did not hold for both gender. In other words, different constructs were measured across gender.

The failure to meet criteria for the unconstrained model in testing for measurement invariance across gender may be due to differences in interpretations and conceptualizations of the items on the cyber bullying and cyber victimization form of the RCBI. Specifically, differences in what behaviors are considered to be cyber bullying as well as in level of awareness about behaviors related cyber bullying, might have influenced responses to some of the items, thus serving as a barrier to meeting criteria for measurement invariance (Tucker et al. 2006). These interpretations are consistent with findings from previous studies, including those from Keith and Martin (2005)'s study, suggesting that comparing males, females may perceive behaviors aimed at damaging social relationships as cyber bullying instead of threating and insulting peoples on the internet. It can be suggested that easy way to resolve this problem is researchers can conceptualize cyber bullying as multidimensional rather than one-dimensional pattern. Moreover Erdur-Baker (2010) claimed that females and males have different perceptions of risky internet usage and girls are becoming more cautious about cyber bullying because girls in Turkey are raised under close supervision and taught to be more self-conscious. Also cultural tolerance for more aggressive behavior in males may have led to the failure to meet criteria for the baseline model when comparing males and females. Thus, males may have been overly engaged in thoughts that their aggressive behaviors unrelated to cyber bullying is offered in a normal and non-threating manner and enables themselves to express ways of feelings and ideas.

Several limitations to this study should be noted. The major limitation of this study is source of the problem in meeting criteria for the baseline model when comparing males and females. It is still unclear whether the failure to establish configural invariance is stem from the content of the items, or characteristics of the sample. Hereby, it is difficult to determine whether lack of fit for baseline model may have been due to differences in testing conditions or differences between the characteristics of males and females (e.g., understanding what behaviors are considered to be cyber bullying, differences awareness of cyber bullying, broadened cultural tolerance for aggressive behaviors in males). Secondly, because this research focuses on adolescents, the generalizability of this results to other groups and is limited. In future research, it will be important to investigate the measurement invariance of scales measuring cyber bullying and cyber victimization with more varied groups such as internet addicts and non-addicts. In this study, multi-group confirmatory factor analysis was utilized to investigate the parameter invariance of scale structures in cross-gender measurement invariance studies. For this reason, there should be future research to determine the reasons why cyber bullying and cyber victimization forms of RCBI are not free of gender-related measurement bias by using different methods. Even with these limitations in mind, the current study is significant in that it is, to our knowledge, the only research that investigated the measurement invariance of such scale measuring cyber victimization and cyber bullying. The information provided by this study may contribute to cyber bullying and cyber victimization literature and may be

provided as a guide for researchers interested in developing measurement tools about cyber bullying and cyber victimization.

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Pre-service and In-service Teachers' Perceptions about Using Web 2.0 in Education

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The purpose of the study was to examine teachers` perceptions about educational technologies, usage frequencies of Web 2.0 technologies, and awareness of these technologies in education. 516 pre-service (308 male and 208 female) who enrolled CEIT departments in education faculties and 317 in-service (229 male and 88 female) ICT teachers who serve in public and private primary schools participated in this study. Three instruments were used for data collection purposes. These instruments included the Views of Educational Technology Scale (VETS), developed by Gomleksiz (2004), the Usage of Web 2.0 Scale (UWS), developed by Ajjan and Hartshorne (2008) developed by the researchers, and the Awareness of Web 2.0 Scale (AWS). Descriptive survey methods was used in this study to collect data. The results of the study showed that the teachers had highly positive feelings about the educational technology usage. The in-service teachers' views about educational technology were more positive than those of the pre-service teachers. Besides, the pre-service teachers' scores of attitudes towards and perceived usefulness of Web 2.0 technologies were higher than those of the in-service teachers. It might be suggested that the views of school administrators, university administrators, and faculty members in teacher training programs might be investigated to determine and evaluate the impact of Web 2.0 technologies in a broader sense through various perspectives.

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Introduction

In the past decade, Web technologies have affected not only where we learn but also what we learn and how we learn. Initially, these technologies were seen as educational and communicational resources similar to the traditional classroom resources. Web contents used to be designed hierarchically and mostly supplied by a limited number of people. Students were mainly browsing or accessing information from web pages and sharing limited knowledge through asynchronous text-based web tools (Greenhow et al., 2009; Hartshorne & Ajjan, 2009). However, nowadays it is seen that Web technologies offer a variety of new opportunities for students and teachers that are different from what has been extensively experienced in the past (Evans & Powell, 2007; Uzunboylu, Bicen & Cavus, 2011).These new technologies facilitate interaction, active participation, reflection, critical thinking, role playing, and collaboration among participants. In other words, Web is not just an information resource anymore; rather it is a platform of information exchange now (Ajjan& Hartshorne,2008; An& Williams, 2010; Conole & Alevizou, 2010).

Recently, a major revolution has occurred in the way Web technology is being used in several settings. It is not a technical revolution, but it is a social revolution (An & Williams, 2010; Conole & Alevizou, 2010; Voithofer, 2007). The new social sharing platform is transforming the Web technology in important ways: from Web 1.0 (read only) environment to Web 2.0 (both read and write) technologies (Anderson, 2007; Greenhowet al., 2009). Web 2.0 has the potential to design more interactive environments in which users become content developers, producers, editors, and evaluators. In other words, these new technologies change how contents are developed, used, shared, and distributed, and make sharing these contents among members and participants much easier than it was in the past (An & Williams, 2010; Conole & Alevizou, 2010).

Web 2.0 offers several powerful digital and also social media technologies that support participation and interaction in various digital formats. Blogs, wikis, podcasting, social bookmarking, and social networking tools are some examples of them. Today's students are growing up by using these technologies and they are considered as "digital natives". They have spent their whole lives surrounded by and using computers, cell phones, and all these Web 2.0 technologies (Davies, 2012; Prensky, 2001). With the help of these technologies, students can easily create information individually or as a group and share it with others. Although these technologies are not designed specifically for use in teaching and learning, they have various characteristics that provide opportunities for student publication, support active and social learning, and enhance effective and efficient feedback to learners in educational settings (Albion, 2008; Wheeler& Wheeler, 2009).

Several researchers have emphasized that the development and growth of new Web 2.0 technologies offer new benefits to education at all levels (e.g. Anderson, 2007; Bennett et al., 2012; Bull et al., 2008; Ulrich et al., 2008; Voithofer, 2007).In spite of their popularity and advantages, these technologies have many challenges. One of the most important challenges concerns the teachers who have difficulty trying to guide and scaffold students using these technologies in their teaching environment. Roblyer et al. (2010) investigated the adoption of social networks by students and instructors and their willingness to transfer their use of these tools from the social life to the educational environment. They found that students were more likely than instructors to use social networks and were significantly more inclined to use these technologies to support their learning. As a result, teachers as digital immigrants seem to be aware of these new technologies, but, generally they might not have much knowledge about how to use them effectively while integrating them into their teaching settings (Moore &

Chae, 2007). In this respect, teachers are expected to co-learn, model, and facilitate the development of several digital and social competencies to be able to cope with these digital natives. In other words, teachers' digital literacy level about Web 2.0 technologies should not be less than students' level to be able to meet these new competencies. Accordingly, more research is needed to explore how and what teachers could do to educate digital natives using these new social web technologies (Schwartz & Digiovanni, 2009; Scott & Ryan, 2009).

Web 2.0 as Digital and Social Media in Teacher Education

Web 2.0 technologies, having emerged in 2000s, have gained the attention of many people from various areas including business, sports, health and also education over the last few years. Nowadays, Web 2.0 technologies are being used by millions of people in an active way. For example, in March 2012, Facebook became the most visited website in the world with more than 835 million users, reaching 35% of Internet users (internet world stats, 2012). YouTube became the second with 800 million unique visitors in each month, reaching 33% of internet users (youtube statistics, 2012). Besides, Wikipedia have450 million users, reaching 19% of Internet users (Wikipedia: Statistics, 2012). Moreover, there are 152 million blogs on the internet, and 80% of active internet users visit social networks and blogs (Cara, 2012). Similarly, the OECD (2007) report showed that 85.2% of the US higher education students were using social networking sites daily and 84.1% of them were using text messaging daily. As reflected in these statistics, Web 2.0 technologies have become very common among people thanks to their characteristics such as, accessibility, usability, functionality, and flexibility. Therefore, it is difficult for educators to ignore this fact and avoid using these technologies (Ajjan & Hartshorne, 2008; An & Williams, 2010; Anderson, 2007).

Moreover, there has been a growing trend to incorporate Web 2.0 technologies into the educational environments due to the possible pedagogical benefits of these technologies such as student publication, active learning, and social learning (Albion, 2008; Ferdig, 2007). Several researchers have agreed that these technologies cause a paradigm shift in teaching and learning environments from the isolated individuals to the communities of practice where collective and cooperative processes are important (e.g. Albion, 2008; Attwell 2007; Evans & Powell, 2007). These technologies are not only the consumers of knowledge, but also the producers of it (Bull et al., 2008; Maloney, 2007). All these are in line with modern educational theories such as social constructivism and connectionism (Cifuentes et al., 2010; Conole & Alevizou, 2010; Ulrich et al., 2008), and for that, they have been used or planned to be usedin educational settings by both pre-service and in-service teachers.

In literature, researchers agreed that both pre-service and in-service teachers' perceptions should be investigated to incorporate and adapt new digital and social technologies into the classroom environments (e.g. Baltaci-Goktalay & Ozdilek, 2010; Coutinho, 2009; Scott & Ryan, 2009). As examples for pre-service teacher studies, Baltaci-Goktalay & Ozdilek (2010 pointed out that participants' perceptions about Web 2.0 technologies were positive and also their acceptance of these technologies and willingness to use them were high. Wassell and Crouch (2008) stated that the blogging environment promoted dialogue, served the participants as a tool to think critically about current issues and debates, and fostered the active expression of thoughts among the participants. Similarly, Lai and Ng (2011) emphasized that wiki usage helped them to develop various skills, such as instructional technology skills, collaboration skills, and organizational skills. Kabilanet al.(2009) investigated Facebook as a useful and meaningful learning environment in English language learning. According to their results, the participants believed that Facebook could be utilized

as an online environment to enhance their learning abilities. Similar to pre-service teachers, research showed that in-service teachers using Web2.0 technologies in education have reported positive attitude and feelings. For instance, Coutinho (2009) investigated the integration of technology in Web 2.0 enriched environments for teacher education programs. She came up with the idea that technology rich training environments develop positive attitudes towards technologies among the participants and encourage them to develop constructivist learning environments in their teaching settings. Likewise, Loving et al. (2007) examined the use of blogging among teachers and found that most of their participants valued blogging for sharing resources and thoughts and reflecting on personal experiences. Every, Garcia and Young (2010) investigated student reactions to a wiki assignment given in a graduate teacher education course. They reported that after the initial phase of developing documents in the wiki interface, participants' reactions were mainly positive, with many identifying the benefits of wikis in learning environment as a resource or collaborative tool. Mazeret al.(2009) pointed out that the participants gave higher levels of credibility to the teachers who put high self-disclosure in their Facebook website.

Despite having positive feelings, teachers have also been faced with several challenges while integrating Web2.0 technologies into their educational settings. One of the most important challenges focuses on the limited models and strategies for effective integration of these technologies in teaching (Albion, 2008; Attwell, 2007; Grant & Mims, 2009; Hew & Brush, 2007; Redecker & Punie, 2010). As Albion (2008) pointed out teacher education programs need to develop appropriate models and strategies to incorporate Web 2.0 technologies in teaching environments. Besides that, Grant and Mims (2009) indeed categorized such challenges regarding the use of Web 2.0 applications and their implications for teaching and learning into five categories of limitations including (a) immature applications, (b) longevity of applications, (c) limited number of applications (d) unconsolidated services and (e) issues concerning security and ethics. Although these technologies benefit both teachers and their students in various respects, many teachers still have little or no experience with Web 2.0 technologies. In other words, pre-service teachers, who are generally digital natives, are being educated with these new technologies surrounding them, but, in-service teachers, who are generally digital immigrants, are trying to incorporate these technologies to their classrooms. It means that they might have different perceptions of the benefits of using Web 2.0 applications (Coutinho, 2009; Scott & Ryan, 2009). By examining both pre-service and in-service teachers` perceptions of using web 2.0 technologies, not only will this study fill a void that currently exists in the research (Albion, 2008; Lai & Ng, 2011; Mazeret al., 2009), but it will also be useful in adapting web 2.0 technologies into learning environments. As a result, the following research questions guided this study:

1) What are the pre-service and in-service teachers` views on using Education Technology?
2) What are the pre-service and in-service teachers' usage frequencies of Web 2.0 technologies?
3) What is the pre-service and in-service teachers` awareness towards Web 2.0 technologies in education?
4) Is there any significant difference between pre-service and in-service teachers' perceptions in terms of views, usage frequency, and awareness of web 2.0 technologies in education?

Method

This study is a descriptive study focusing on pre-service and in-service ICT (Information and Communication Technologies) teachers` perceptions about Web 2.0 technologies as digital and social media in their class environments.

Description of ICT teachers in Turkey

Departments of the Computer Education and Instructional Technologies (CEIT) have been established in order to educate ICT teachers for schools in Turkey (HEC, 1998). These departments, established within the education faculties, enrolled their first students in the 1999 academic year. ICT teachers who graduated from these departments are mainly working in both public and private schools. Their main responsibilities are integrating technology into classrooms and mentoring other teachers' use of technology. In other countries, it is seen that the title or the roles of the teachers who are mainly responsible for integrating technology vary from one country to another; they might have such roles as computer coordinators, technology coordinators and media specialists (Law &Plomp, 2003). In France, for example, the government decided that all schools have computer coordinators who help teachers while integrating technology into their teaching practices (Reigner, 2003).

Participants

The subjects of the study were selected from pre-service teachers (N=516) who enroll at the CEIT departments, in Education Faculties, in 14 different universities, and in-service ICT teachers (N=317) who serve in public and private primary schools, high schools, and vocational high schools. Table 1 shows the characteristics of the pre-service and in-service teachers.

Table 1: *The Characteristics of the Pre-Service and In-Service Teachers*

	Pre-Service		In-Service	
	N	%	N	%
Gender				
Male	308	60	229	72
Female	208	40	88	28
Having a personalcomputer				
Yes	493	96	310	98
No	23	4	7	2
Weekly internet usage				
Lessthanonehour	17	3	4	1
Between 2-5 hours	90	17	31	10
Between 6-10 hours	99	19	48	15
Morethan 10 hours	310	61	234	74

Instruments

Three instruments were used for data collection purposes. These instruments included the Views of Educational Technology Scale (VETS), the Usage of Web 2.0 Scale (UWS), and the Awareness of Web 2.0 Scale (AWS).

The Views of Educational Technology Scale (VETS) was adapted from a questionnaire developed by Gomleksiz (2004). In order to evaluate the clarity and relevance of the items, the adapted questionnaire was reviewed by two experts in the instructional technology field.

The questionnaire consisted of 5 five-point Likert scale items which sought to measure teachers' views on using educational technology. The reliability of the original sub-scale was determined to be high, 0.81 (Gomleksiz, 2004). In this study, the Cronbach alpha internal consistency coefficient was 0.71.

The Usage of Web 2.0 Scale (UWS) was developed by the researchers. The scale consisted of 5five-point Likert scale items, including a not applicable choice as well, from 1(rarely - less than an hour a week) to 5 (very frequently – more than 10 hours a week) which sought to measure teachers` perceptions about their usage frequencies of seven most common Web 2.0 technologies (see Table 3) in their personal life. The reliability of the scale was determined to be high, 0.79.

The Awareness of Web 2.0 Scale (AWS) was originally developed by Ajjan and Hartshorne (2008), consisting of items exploring participants' comfort level with Web 2.0 technologies, their actual usage of specific Web 2.0 technologies in the classroom, and their attitudes toward specific Web 2.0 technologies in education. In this study, the four sub-scales (ease of use, compatibility, attitude, and perceived usefulness) were adapted to measure teachers` awareness towards Web 2.0 technologies in education. Similar to the VETS, this scale was reviewed by two experts in the instructional technology field to evaluate the clarity and relevance of the items. Ajjan and Hartshorne (2008) reported the internal consistency coefficient as 0.90 for the ease of use scale, 0.91 for the compatibility scale, 0.93 for the attitude scale, and 0.95 for the perceived usefulness scale. In this study, the internal consistency coefficient, Cronbach alpha, was computed as0.68 for the ease of use scale, 0.83 for the compatibility scale, 0.83 for the attitude scale, and 0.91 for the perceived usefulness scale respectively.

Data Collection

Pre-service and in-service ICT teachers were asked to participate in this study at the end of the fall term of 2010. They were informed that their participation would be voluntary and they had the right not to participate. 14 Turkish universities' Education Faculties were requested to access their pre-service teachers and these teachers were invited by these contact faculties through a mailing list. In addition, in-service teachers were accessed during a national training conference and through in-service teacher national web communities (Facebook and onlineforums). During the last two months of the fall term, both groups of ICT teachers were asked to anonymously complete the three online surveys (VETS, UWS, and AWS).

Data Analysis

The data gathered through the three online questionnaires were analyzed by descriptive analysis (e.g., means, standard deviations, and percentiles) and multivariate analysis (MANOVA) to examine the differences between pre-service and in-service teachers` perceptions about Web 2.0 technologies in their class environments by using the statistical analysis software SPSS 16.0.

Results

Descriptive Analysis

Table 2, Table 3, and Table 4 present the descriptive statistics (mean, standard deviation) for the ICT teachers` views on using educational technology, their Web 2.0 technologies usage frequencies, and their awareness of Web 2.0. According to Table 2, both the pre-service and the in-service teachers strongly agreed to the statements expressing views on using technology in the teaching environment (M=4.3 and M=4.5 respectively).

Table 2: *The Teachers` Views on Using Educational Technology*

	Pre-Service			In-Service		
	N	M	Std	N	M	Std
I am interested in using education technology in the classroom.	516	4.7	0.8	317	4.7	0.8
I would like to learn more about new developments in education technology.	516	4.6	0.7	317	4.7	0.8
Students pay more attention when I use technology in the class	516	4.3	0.8	317	4.4	0.9
I have enough knowledge for using technological aids.	516	4.0	1.0	317	4.4	1.0
I follow new developments in education technology properly.	516	3.9	0.9	317	4.3	0.9
Average	516	4.3	0.6	317	4.5	0.6

Table 3 shows the ICT teachers` usage frequencies of Web 2.0 technologies. The pre-service teachers generally preferred to use social networking, RSS and syndication, collaborative authoring, and multimedia sharing. On the other hand, the in-service teachers mainly favoured using social networking, collaborative authoring, and multimedia sharing.

Table 3: *The Teachers` Web 2.0 Technologies Usage Frequencies*

	Pre-Service				In-Service			
	N	%	M	Std	N	%	M	Std
Social Networking (i.e. Facebook, MySpace)	516	4.3	3.8	1.3	317	7.6	3.2	1.6
RSS and Syndication (i.e. Google Reader)	516	10.1	3.4	1.4	317	10.4	2.4	1.4
Collaborative Authoring (i.e. Wikipedia, GoogleDocs)	516	7.4	3.3	1.3	317	5.7	3.1	1.3
Multimedia Sharing (i.e. Flickr, YouTube)	516	5.6	3.3	1.3	317	4.7	2.9	1.3
Audio Blogging and Podcasting (i.e. iTunes,MeVio)	516	21.5	2.2	1.3	317	11.4	2.0	1.2
Blogging (i.e. Blogcu.com, Blogger.com)	516	13.4	2.1	1.2	317	9.5	2.2	1.4
Tagging and Social Bookmarking (i.e. Delicious, Sitebar)	516	12.6	1.9	1.2	317	13.9	2.0	1.2
Average	516		2.6	1.0	317		2.3	1.0

Table 4 shows the ICT teachers` awareness towards Web 2.0 technologies in regard to ease of use, compatibility, attitude and perceived usefulness. The pre-serviceteachers' overall mean scores for these variables were M=3.9, M=3.9, M=4.1, and M=4.1. Moreover, the in-service teachers' overall mean scores for these variables were M=3.9, M=3.8, M=4.0, and M=3.9 respectively.

Table 4: *The Teachers` Awareness Towards Web 2.0 Technologies in Education*

	Pre-Service			In-Service		
	N	M	Std.	N	M	Std.
Ease of use						
I feel that using Web 2.0 will be easy	516	3.9	0.9	317	4.0	0.9
I feel that using Web 2.0 will be easy to incorporate in my classroom environment	516	3.8	0.8	317	3.8	1.0
Average	516	3.9	0.7	317	3.9	0.8
Compatibility						
Using Web 2.0 technologies are compatible with the way I teach	516	3.9	0.8	317	3.8	0.9
Using Web 2.0 technologies fit well with the way I teach	516	3.9	0.8	317	3.8	0.9
Average	516	3.9	0.8	317	3.8	0.9
Attitude						
Web 2.0 is useful in my teaching	516	4.2	0.7	317	4.0	0.9
Using Web 2.0 is a good idea	516	4.2	0.8	317	4.0	0.9
The advantage of using Web 2.0 outweighs the disadvantages of not using it	516	4.0	0.9	317	3.9	1.0
Average	516	4.1	0.7	317	4.0	0.8
Perceived usefulness						
I feel that using Web 2.0 will improve students' grades	516	4.1	0.8	317	3.9	0.9
To help my students better learn the material, I will incorporate Web 2.0 technologies in the classroom	516	4.1	0.8	317	3.8	1.1
I feel that using Web 2.0 will help my students learn more about the subject	516	4.0	0.8	317	3.9	0.9
I feel that using Web 2.0 will improve students' satisfaction with the course	516	4.0	0.8	317	4.0	0.9
I feel that using Web 2.0 will improve students' evaluation	516	4.0	0.8	317	3.9	0.9
Average	516	4.1	0.7	317	3.9	0.8

Multivariate Analysis

A one-way MANOVA was conducted to determine the effect of teacher status (pre-service and in-service) on the teachers` perceptions about Web 2.0 technologies. Assumptions of MANOVA was tested to check for normality, linearity, homogeneity of variance–covariance matrices, and multi collinearity with no serious violations noted in either of the test scores. Also, outlier analysis was conducted and 22 outliers were removed from the dataset. The results showed that significant differences were found between the pre-service and the in-service ICT teachers' perceptions on dependent measures (Wilks' Λ =0.882, F(6,803) = 17.84, P < .001). The multivariate $\eta 2$ based on Wilks' Λ was strong, 0.118.

Analyses of variances (ANOVA) on each dependent variable were conducted as follow-up tests to the MANOVA. All tests were significant at the 0.05 level, except for ease of use and compatibility variables. Table 5 summarizes the significant ANOVA results. The in-service teachers` views on using educational technology were significantly more positive than those of the pre-service teachers (F(1,808)= 34.774, p<0.01, $\eta 2$=.041). On the other hand, the pre-service teachers` Web 2.0 technologies usage frequencies (F(1,808)= 12.642, p<0.01,

η2=.015), their scores of attitudes towards these tools (F(1,808)= 11.681, p<0.01, η2=.014) and their scores of these tools' perceived usefulness (F(1,808)= 10.582, p<0.01, η2=.013)were higher than those of the in-service teachers.

Table 5: *Post Hoc Anova Test Result*

Dependent Variable	df	F	η^2	p
Views on using Educational Technology	1	34.774	.041	.000*
Web 2.0 technologies usage frequency	1	12.642	.015	.000*
Ease of use	1	.000	.000	.991
Compatibility	1	1.648	.002	.200
Attitude	1	11.681	.014	.001*
Perceivedusefulness	1	10.582	.013	.001*

*** p<0.05**

Discussion

Web 2.0 technologies, causing a cultural change in terms of communication, knowledge, and information in various areas, are used globally as sharing media by more than a billion people (Anderson, 2007). Similarly, the use of educational technologies to support teaching and learning has changed over the last decade with the increased functionality and popularity of Web 2.0 technologies, which have various potentials to improve teaching and learning (Hartshorne & Ajjan, 2009). These technologies bring new roles, new pedagogies, and new approaches to today's teachers. In order to develop such innovations and integrate them into the learning and teaching environments, researchers state that views, competencies, and awareness levels of the teachers who incorporate these technologies into their classes need to be analyzed and enhanced (Albion, 2008; Coutinho, 2009; Greenhowet al.,2009; Moore & Chae, 2007). Therefore, this study was designed to examine both pre-service and in-service teachers` perceptions of using web 2.0 technologies.

In this study, the teachers had highly positive feelings about the use of educational technology. They were highly interested in learning new educational technologies and using these technologies in their classrooms. Similarly, in the literature, there has been a growing trend to incorporate new technologies into the educational environments due to their provision of various opportunities (e.g. accessibility, ease of use, and functionality) and their possible pedagogical benefits (e.g. active learning, and social learning) (Albion, 2008; Bull et al., 2008; Moore & Chae, 2007). In their personal life, social networking, such as Facebook, and collaborative authoring technologies, such as Wikipedia were mainly used by the teachers in this study. In other words, almost 95% of the teachers had access to these two technologies. This result was parallel to the public Web 2.0 technologies usage frequencies (Ionescu, 2010) and other university students' Web 2.0 technology usage frequencies (e.g. OECD, 2007). The results also showed that the teachers were generally aware of Web 2.0 technologies' benefits in educational settings, and, they did not have much difficulty while using and adapting these new technologies to their teaching.

Although the teachers` views about using educational technology and their awareness towards Web 2.0 technologies in education were positive, there were some differences between the pre-service and the in-service teachers` perceptions about Web 2.0 technologies. For example, the results showed that the in-service teachers' scores on their views about using educational technology were higher than those of the pre-service teachers`; however, they were using these technologies less frequently than the pre-service teachers. The reason behind might be that the teachers who have actual teaching experience using educational technologies have

become more aware of the possibilities and the implications of integrating them into their teaching (Voithofer, 2007). Moreover, the pre-service teachers' scores of attitudes towards Web 2.0 technologies and their scores of these tools' perceived usefulness were higher than those of the in-service teachers. This interesting result might be due to the gap between the training in university and the real life practices (Bull et al., 2008). Also, several researchers have agreed that there might be some barriers to the effective integration of these new technologies into classroom such as the deficiencies of Web 2.0 technologies themselves (e.g. immaturity, longevity and security) and the pedagogical deficiencies (e.g. lack of familiarity with how to use these technologies and lack of educational theories regarding how to design technology-compatible teaching and learning environments) (e.g. Albion, 2008; Attwell, 2007; Grant&Mims, 2009; Greenhowet al.,2009).

This study mainly showed that Web 2.0 technologies are common among the investigated teachers. They were generally aware of these technologies and their potential uses in educational environments. The teachers participated in this study agreed on adapting educational technologies and benefiting from them while designing their lessons and classroom environments. However, it did not show that they used all new Web 2.0 technologies frequently in their personal and/or professional lives. Actually, they used some of them often, but, some of the applications were used very rarely, such as, social bookmarking, podcasting, and blogging. Like with many new educational technologies, teachers need to see how these technologies are designed and used effectively (Coutinho, 2009). Especially, pre-service teachers' beliefson educational technologies could be enhanced by increasing their teaching experience in real teaching contexts (Voithofer, 2007) or by increasing the use of web 2.0 technologies in universities to provide students with an opportunity to experience such processes themselves (Bull et al., 2008; Sendallet al.,2010). The study also showed that the in-service teachers' awareness about Web 2.0 technologies was less than that of the pre-service teachers. This, in fact, could be enhanced by providing institutional support, aligning curricula accordingly, or providing regular teacher training sessions (Hew & Brush, 2007; Redecker & Punie, 2010).

Conclusion

Over the last few years, Web 2.0 technologies have been changing how people access and exchange knowledge and information, and how people connect and interact in various areas, like in education (Ajjan & Hartshorne, 2008; An & Williams, 2010; Redecker & Punie, 2010). Teachers and their students, both of whom are already using these technologies in their personal lives, are also feeling under pressure to use these technologies in their educational environments. For that reason, the number of studies about the use and adaptation of Web 2.0 technologies in education has increased in recent years (Albion, 2008; Hartshorne & Ajjan, 2009; Voithofer, 2007). Similarly, teachers` perceptions about educational technologies, usage frequencies of Web 2.0 technologies, and awareness of these technologies in education were investigated in this study. According to the results, teachers had highly positive feelings about the educational technology usage and their awareness towards Web 2.0 technologies in education was also high. They mainly preferred to use some Web 2.0 technologies more often, such as social networking in their personal lives. There were also some differences between the pre-service and in-service teachers` perceptions about the Web 2.0 technologies. The in-service teachers' views about educational technology were more positive than those of the pre-service teachers. However, they were using Web 2.0 technologies less frequently than the pre-service teachers. Moreover, the pre-service teachers'

scores of attitudes towards and perceived usefulness of Web 2.0 technologies were higher than those of the in-service teachers.

Although there are several studies related to the use of digital and social media technologies in education, as the results of this study show, several researchers agree that there is still a need for more in-depth studies to increase the potential benefits of these technologies (Hartshorne & Ajjan, 2009; Lai & Ng, 2011).Especially, there is a need to examine teachers` experiences and perceptions since they are the real implementers and decision makers when adapting these technologies in teaching-learning environments. This study analyzed both the pre-service and in-service teachers` perceptions, but, it had several limitations. For example, the participants of this study were ICT teachers who might have been more inclined towards using these technologies in their classes and personal lives than teachers of other subject matters. That might weaken the generalizability of the results though the number of participants in the study was adequate. Accordingly, the study could be replicated with teachers of other subject matters as well. Also, future research is still necessary in order to really observe teachers when applying Web 2.0 technologies into their courses. Besides, in another study, it might be interesting to examine how gender, weekly internet usage, age, or other demographic variables contribute to teacher perceptions. Moreover, the views of school administrators, university administrators, and faculty members in teacher training programs might be investigated to determine and evaluate the impact of Web 2.0 technologies in a broader sense through various perspectives.

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Effectiveness of the Nature of Science Activities Developed for 5th Grades

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Within the context of new findings about nature of science, literature has been reviewed and it was seen that the activities to develop nature of science understanding were not adequate. For this reason, new activities were developed as a part of 5th grade 'Matter and Change' unit and their effectiveness was tested. The research was conducted with 5th grade students from two classrooms, who were attending to a middle school in a village of city of Tokat. Activities developed about the unit; 'Thermoscope to Thermometer', 'Bingo Game' and 'Science Wheel' activity from the literature were applied to experimental group with textbook content, as for control group the nature of science concepts were integrated with textbook content. VNOS-E questionnaire was conducted both for pretest and posttest to experimental and control group, the questionnaires were coded by three researchers and the coefficient of consistency was calculated as 0,78. Results indicated that, experimental group's view of nature of science in all dimensions was changed in a positive way, a significant difference was found between the posttests of two groups in experimental group's favor. The activities were effective in developing students' views about the nature of science. The regular curriculum was not effective in nurturing nature of science views as a consequence because the theoretical basis regarding the nature of science in the renewed science curriculum is not supported with appropriate activities, methods and classroom resources. As a result, essential and applicable suggestions were made for those who concerned.

Introduction

Today those scientific developments happened intensely, in most countries, the ultimate purpose of science education is stated as developing individuals' scientific literacy. Scientific literacy is defined as individual's decision making in such cases as required for science and technology which he shows responsibility and having necessary skill and information to activate him cognitively (Laugsksch, 2000).

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Global climate change, energy resources, stem cell researches and socio-scientific problems that related to most developments in modern medicine are matters interest not only scientist and specialists who works in those fields but also every individual in society. Individuals have high scientific literacy may attend processes by stating their opinions about these topics. Therefore, it is important that scientific literacy to be developed and for this Nature of Science to be understood (Fowler, Zeidler & Sadler, 2009). In renewed science curriculum it was given wide publicity to ability of questioning about socio-scientific matters in the fields of understanding science-technology-society and environment to understand the Nature of Science (MEB, 2013). Without an common portrayal of researchers, the Nature of Science was defined by McComas, Clough and Almazroa (2002) on explaining matters such as what the science is, how it works, how scientists work as a social group and how society steers scientific efforts and reacts to explanations of matters; as a mixture of various social sciences which includes philosophy of science that was integrated by research with cognitive sciences like psychology, history of science and sociology of science. As for science educators, they indicated that NOS determines the intersection of issues addressed by philosophy of science, history of science, sociology of science, psychology of science as they apply to and potentially affect science education and science learning; and were fundamental domains for science education.

According to researchers studying on science and Nature of Science, features that have to be mentioned are specified as: 1)The Tentative Nature of Scientific Knowledge, 2)Th e Empirical Nature of Scientific Knowledge, 3) Subjectivity, 4) Creative nature of scientific knowledge, 5)The Social and Cultural Embeddedness of Scientific Knowledge, 6) Observations, inferences and theoretical entities in science, 7) Scientific theories and laws, 8) The theory-laden nature of scientific knowledge, 9) Myth of scientific method (Lederman, Abd-El-Khalick, Bell & Schwartz, 2002). The Nature of Science involves understanding what science is, which roles it includes, who scientists were and which roles they played, scientific facts, observations, events, rules, scientific method and how they do science (Taşar, 2003).

There are three approaches to develop understanding on the Nature of Science in general. These are historical, implicit and explicit-reflective approaches. Studies have shown that explicit-reflective approach is the most effective method among these approaches. Explicit-reflective approach is a kind of successful approach which was found effective on teaching the Nature of Science to a lot of groups (Abd-El-Khalick, Lederman 2000). Developing students' understanding about the Nature of Science in early classes may help them to comprehend both the Nature of Science and course content of science better (Akerson, Buck, Donnelly, Nargund-Joshi &Weiland, 2011). Akerson and Donnelly (2010) indicated that explicit-reflective approach was a successful approach even for the pre-school period children. Akerson, Nargund-Joshi, Weiland, Pongsenon and Avsar (2013) carried out explicit-reflective approach to 3rd grades (8 year old groups according to American education system) for a school year and found out that it was effective. It was seen that among three students chosen situational at the end of teaching period of the Nature of Science rest upon explicit-reflective approach, low-successful student was able to discuss the Nature of Science, middle-successful student was able to discuss and write about it and high-successful student was able to discuss, write and put forward some questions about the Nature of Science. It was clearly seen that students were able to learn concrete extents of the Nature of Science (like difference between experimental data and observation and inference) easier in comparison with abstract ideas (like being subjective, creative and tentative) about it. Hence, Akerson et al. (2013) indicated that at first more concrete ideas has to be emphasized then more abstract ones while teaching young students the Nature of Science.

It was observed in literature and most studies about the Nature of Science that it was given independently of the content of science. Besides, studies done with primary school, 5th grade and pre-school period students are in a limited number. In this study, 5th grade students were chosen as working group and explicit-reflective method integrated with the 'Matter and Change' unit was interiorized then students' ideas about the Nature of Science were analyzed . It was thought that this research would shed light to studies about teaching the Nature of Science in early ages on account of choosing 5th grade students as sample and involving new the Nature of Science activities aimed at 'Matter and Change' unit.

Method

Research Model

In the study, quasi-experimental method with pretest posttest control grouped was used. One of the 5th grades from the school that intervention was performed was experimental group, the other one was chosen as control group; before and at the end of study a the Nature of Science questionnaire was conducted to both groups for the purpose of defining their opinions about the Nature of Science.

Sample of Study

Study; was carried out with 30 5th grade students studying in a primary school in a village of city of Tokat. There are two 5th grade classes in the school that the questionnaire was conducted in. socio-economic status, success average and family profiles of students are equal. Also, same teachers lectured those students. Within the scope of the study, fifteen students were chosen randomly from classes for each experimental and control groups. During 'Matter and Change' unit; activities were used from 5th grade Science course book in control group, any different activities related with nature of science aspects were not conducted. While in experimental group the Nature of Science activities developed by researchers were combined with teaching of 'Matter and Change' unit and performed with explicit-reflective method. Neither of groups was taught about the aspects of the Nature of Science.

Data Collecting Tools

In study, VNOS-E Questionnaire, developed by Lederman and Ko (2004) and brought in our literature by Erenoğlu (2010), is used. Aspects about questions that the questionnaire includes are ranked below.

Table1. Aspect of VNOS-E questionnaire

Nature of Science Aspect	VNOS-E Items						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Scientific knowledge is reliable and valid	X		X	X		X	
Scientific knowledge involves logical, mathematical and experimental inferences	X	X					
Scientific knowledge is subjective	X				X		
Imagination and creativity has a great role in acquiring	X			X			X

scientific knowledge			
Observation and inference are different concepts	X	X	X

Reference: Seçkin, 2013; 34.

Practices

Research was conducted with 5th grade students during "Matter and Change" unit in Science lesson for 5 weeks total of 20 course hours. In experimental group the Nature of Science was taught via explicit-reflective method, while in control group activities were in line with regular curriculum in Science lesson, nothing different had been done about the Nature of Science apart from content of course book.

Activities Used for Experimental Group

In study; a new drama activity called 'Thermoscope to Thermometer', proper to explicit-reflective approach which was created by researchers and 'Bingo Game' and 'Science Wheel' which takes part in literature were customized to the subject and carried out. Expert opinions were received for activities that developed by researchers and activities were used integrated with curriculum. In *Table 2* activities and aspects of the Nature of Science that those activities reflected are given. Besides, explanations belong to relevant activities are presented.

Table 2. Activities' nature of science aspects

Nature of Science Aspects	**Activities**		
	Science Wheel	Thermoscope to Thermometer	Bingo Game
Scientific Knowledge is reliable and valid	X	X	
Scientific Knowledge involves logical, mathematical and experimental inferences	X	X	X
Scientific Knowledge is subjective		X	
Imagination and creativity has a great role in acquiring scientific knowledge	X		
Observation and inference are different concepts	X		X

Science Wheel: It is an activity aims to reveal students' ideas about science, scientists and scientific knowledge (Doğan, Çakıroğlu, Bilican & Çavuş, 2010). It was expected from students to observe and make inferences from experiments on the subject of states of matter. In activity a wheel of concept was generated on the board.

Bingo Game: Teacher picks up three children that he stated before and arranges a seating order as students able to see each other. Then gives Bingo cards to chosen students. After picking another student, he gives a bag full of colorful cartons. There are pictures in the bag represents Expansion, Contraction, Boiling, Condensation and Sublimation. Each of the students representing those concepts takes the picture from bag and acts like it. Meanwhile, the teacher wants students to observe their friends and find out which student represents which concept. He wants them to explain their observations and inferences.

Thermoscope to Thermometer: This drama is an activity consisting of part reading and

discussions. In activity, students are primarily given drama activities to work at home, are asked to research the creation of thermometer. The materials used in the experiments to be made are previously obtained. Then, the experiment of the inflation of hot water containing balloon which was put at the end of the bottle is done. Students are expected to reach the conclusion that when the air expands the volume increases. "Thermoscope to Thermometer" reading part is read and drama part begins. Drama is based on an imaginary conversation between Galileo and his friends Santorio Santorio and Gian Francesco Sagredo who were living with him in Vienna. After the speeches, the lack of the invention made at the time is introduced and the need for a transition to a modern thermometer is emphasized.

Data Analysis

The Nature of Science questionnaire was tested out to experimental and control groups as pretest and posttest. Those tests are evaluated by three researchers, wrong answer was coded as inadequate, partly adequate as convenient and desired leveled answers were coded as modern opinion and they were scored in order of 0,1 and 2. In study interceder reliability was calculated as 0,78. The descriptive analysis of students' answers was done and change in dimensions of the Nature of Science was tried to be set via comparing pretest and posttest results.

Findings

The descriptive analysis of pretest and posttest points of the Nature of Science questionnaire tested out to experimental and control groups is given in Table 3.

Table 3. The descriptive analysis of groups according to aspects of the nature of science

	Group		1			2			3			4			5			6			7		
			0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2	0	1	2
Pretest	Experiment	n	12	2	1	13	2	0	7	8	0	8	6	1	11	4	0	10	4	1	5	10	0
		%	***80***	**13**	**7**	***87***	**13**	**0**	***47***	**53**	**0**	***53***	**40**	**7**	***73***	**27**	**0**	**67**	**27**	**7**	**33**	**67**	**0**
	Control	n	12	2	1	14	1	0	8	6	1	4	10	1	12	3	0	15	0	0	5	10	0
		%	**80**	**13**	**7**	**93**	**7**	**0**	**53**	**40**	**7**	**27**	**67**	**7**	**80**	**20**	**0**	**100**	**0**	**0**	**33**	**67**	**0**
Posttest	Experiment	n	6	7	2	3	12	0	3	8	4	7	4	4	7	5	3	7	4	4	2	10	3
		%	***40***	**47**	**13**	***20***	**80**	**0**	***20***	**53**	**27**	***47***	**27**	**27**	***47***	**33**	**20**	**47**	**27**	**27**	**13**	**67**	**20**
	Control	n	12	3	0	5	10	0	4	9	2	12	2	1	11	4	0	11	4	0	6	8	1
		%	**80**	**20**	**0**	**33**	**67**	**0**	**27**	**60**	**13**	**80**	**13**	**7**	**73**	**27**	**0**	**73**	**27**	**0**	**40**	**53**	**7**

0: Inadequate 1: Convenient 2: Modern Opinion

When groups' answers were analyzed in the basis of categories, it was seen that both groups got almost same points. It was observed that change among inadequate questions percentage decreased in every questions of experimental group but increased in 4th and 7th questions of control group. The rate of convenient ideas increased in 1St -2nd and 5th questions, never changed in 3th-6th and 7th questions but decreased in 4th question of experimental group. As for control group there was a decrease in 4th and 7th questions but an increase in others. For modern opinions; in experimental group there was an increase but a decrease in 2nd question; in control group there was a decrease in first question, a decrease in 3rd and 7th questions but no change in others.

When questions' posttest test points according to the aspects of the Nature of Science were analyzed for "Scientific Knowledge is reliable but can change" dimension pretest 1, 3, 4, 6; after teaching, convenient and modern ideas were increased 40% (from 20% to 60%), in 3rdquestion 27% (from 53 to 80), in 4th question 7% (from 47 to 54) and in 6th question 20%. In control group rates of change are in order of 0, 26, -44 and 7. It was found that answers

given to 1st and 2nd questions related to the dimension of "Scientific Knowledge involves logical, mathematical and experimental inferences" changed widely to convenient from inadequate (idea of convenient in 2nd question from %13 to %80, in control group from 7% to 67%), and rates of change in control group were 67 and60. Total change of convenient and modern ideas for the 5th question from 1st and 5th which are related to the "Scientific Knowledge is subjective" dimension is 26% in experimental group and 7% in control group. When questions 1, 4 and 7 which are in the "Imagination and creativity has a great role in acquiring scientific knowledge" dimension were analyzed in the change in 7th question was observed as 20% in experimental and 3% in control groups. The last dimension "Observation and inference are different concepts" involves questions 1, 4 and 6 and an increase was observed an increase in countenance to experimental group on a par with first sub-dimension and in order of 40, 7 and 20 percentages. It is seen that increase of point of experimental group in all dimensions related to the Nature of Science is surplus. Change is surplus in the dimensions as "Scientific Knowledge is reliable but can change", "Imagination and creativity has a great role in acquiring scientific knowledge", "Scientific Knowledge is subjective", "Observation and inference are different concepts."

It was controlled whether data distribute normally via Kolmogorov – Smirnov test in order to define which statistical analysis will be used to compare pretest and posttest point of experimental and control groups. The pretest value for control group was found as K –S z=0,599 p=0,866 and posttest z=0,527 p=0,944. For control group it was found as K-S z=0,778 p=0,580 and for posttest z=0,672 p=0,757 which shows normal distribution. Parametric tests can be carried out (Pallant, 2005).

Pretest and posttest total scores were compared between groups with independent sample t-test. Results of independent samples t test are given in Table 4.

Table 4. t test results for pretest and posttest

	Groups	N	$\bar{X}$	S	sd	t	p
Pre-test	Control	15	2,53	1,73	28	-0,344	0,733
	Experiment	15	2,80	2,45			
Post-test	Control	15	3,20	2,21	28	-2,365	0,025*
	Experiment	15	6,00	4,02			

As it is seen in Table 4 there is not any significant difference between students' pretest results (t= 0,344, p>0,05). Accordingly, it can be said that both groups are similar to each other before activities was done in terms of ideas about the Nature of Science. A significant difference between pretest results was found after activities about the Nature of Science practiced in experimental group at the end of unit (t= -2,365, p<0,05). It shows that those activities done oriented to the Nature of Science are effective to develop students' ideas about the Nature of Science. Calculated effect size (n^2=0,2) is quite extensive (Büyüköztürk, 2012). Accordingly, it can be said that 20% of variance seen in the Nature of Science originated from carried out activities.

In control group, activities only in curriculum were done. Although there is an emphasis on teaching the Nature of Science in new Science curriculum, it is obvious that this was not reinforced with appropriate activities and methods. In that case, it can be alleged that usage of activities for the Nature of Science is significantly more effective in accordance with the lesson that activities in not used.

Discussion

In this study, changes in 5th grade students' ideas about the Nature of Science after activities that performed to develop their understanding on the topic of the Nature of Science were analyzed. In control group some other activities were carried out beside ones in course book while in control group any activities were carried out except for activities in 5th grade Science course book that are used convenient for Science lesson curriculum. As a result of activities; a significant difference in points of experimental group from the Nature of Science questionnaire was seen but not in the points of control group (Table 4). There are some studies supporting indications about idea intended to the Nature of Science intellects can be developed via applying variable activities in early ages (Akerson et al., 2011; Can & Şahin Pekmez, 2010; Erenoğlu,2010).

When points of students in control group analyzed, an increase was seen for inadequate questions in 3rd (Scientific knowledge can change) and 7th (Role of imagination and creativity) questions. This, conjures up that teaching based upon course book resulted in that situation. It is observed that students' ideas on the tentative nature of scientific knowledge changed to inadequate idea at the rate of 50%. This is can be because; they were not given feedback about their answers to questions in questionnaire after practice, students' exchanging opinions about their answers on questionnaire and changing their ideas by reason of being unsure about the answers they gave. It can be indicated as another reason to affect each other's idea that expressions in course book were written in such a manner that they were largely indicating certainty of scientific knowledge. However, it is quite apparent that teaching merely depended on course book activities and approach as in control group is not sufficient to develop ideas about the Nature of Science which was envisioned in renewed science program.

When experimental group students' the Nature of Science perceptions were handled in terms of different dimensions it was seen obviously that there was a point rise in all dimensions and inadequate ideas changed to convenient or modern opinion. This reveals that carried out activities were effective in expected level. It was found out that the least point rise was in the dimension of "Scientific Knowledge involves logical, mathematical and experimental inferences." The reason of shortage in observed development, despite giving place to this dimension in activities, can be that deducing may become majorly abstract for students. In addition to activities in this study allowing activities involving mathematical operations and statements without ignoring educational attainments can be very effective on developing ideas in that dimension. In survey questions about this dimension, students were presented the definition of science and feature that make it different from other fields. Due to associating science only with situations faced in science lessons, they might have thought on the basis of lesson and have difficulty in making distinction. Another reason is the relatively quiet shortage of questions about this dimension. Asking questions about all dimensions for revealing students' ideas can increase validity. When analyzed on the basis of questions, it is in 6th question that inadequate opinions changed into convenient and modern opinions in the least numbers. In this question, students were expected to comment on certainty of information that meteorologists gave about weather conditions. The question is about observation and aspect of deducing and changeability of scientific knowledge. Even though these dimensions were given place in activities students had difficulty in commenting in this question. The reason of this can be the information about climate and weather they were given during former educations. Also, 5th grade students are generally in tendency to confuse climate with weather and they have misconceptions about these subjects (Henriques, 2000; Doğar & Başıbüyük, 2005). This may prevent those making right inferences in this question.

Especially if ideas in this dimension at the level of 5th grade are about a subject that students do not have difficulty in understanding, it will be able to get convenient and modern opinions in high rate

Conclusion and Suggestions

Within the context of progress about the dimension of the Nature of Science; considering that activities aimed at understanding the Nature of Science were not in expected level within the 5th grade "Matter and Change" unit, new activities were developed and productivity of activities was tested. It was defined with research findings that experimental students got higher points in comparison with control group from VNOS-E scale. Accordingly, it was ascertained that under the favor of generated activities experimental group students made more progress in comparison with control group students in understanding the Nature of Science. Moreover, when pretest and posttest points were analyzed in themselves it can be said that comprehension ability of both group about the Nature of Science was increased, thus both teachings (the Nature of Science activities and teaching in curriculum) made a contribution to students about understanding the Nature of Science. In the considerations of this study it can be said as:

- In order to make students understand the Nature of Science some activities like these and similar to these must be added to course books and these activities must be integrated to the unit.
- Teacher of Science of Technology/Physical Sciences can take advantage of these activities while teaching different units and in different classes.
- Field researchers, can do research in different levels with these activities.
- Prospective teachers can be lectured about how to organize the Nature of Science activities.
- In service trainings can be organized for Teacher of Science of Technology/Physical Sciences aimed at how to organize the Nature of Science activities.
- By putting emphasis on the studies of nature of science on the level of primary school, we can raise awareness of class masters.

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Student Teaching in Diverse Settings

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This study explores the cases of teachers who had overseas field experience. In this study, it is aimed at hearing what teachers say about their experiences and announce their reflections for others in order to contribute others' learning that have not had cross-cultural experiences. In order to reach the aim of this study, the researchers have addressed the following research questions throughout this research: 1. Do participants perceive cross-cultural teaching as an aid to self- development?, 2. Do participants believe overseas experiences lead them to gain global perspectives?, and 3. What kind of learning has occurred within overseas experiences? In order to grasp the feelings and ideas of the teachers, semi-structure interview has been used. The respondent group of this study is four teachers. The findings of this current study obviously reveal that the participant teachers have benefited positively as a result of overseas experiences. These benefits include both personal and professional development. The participant teachers explained that they have learned much about instructional methodology, how to access children, and various classroom management styles based upon interaction with teachers in host nations and classroom observations. Also, by living in a different country, the participant teachers have reported that they have learned first-hand information about culture, tradition, folklore, history, and social condition of host nations. Learning these experiences help them, as teachers, to gain a meaningful perspective on other cultures, figure out the deepest ideas, assumptions, ideologies, which create that culture and it allows being aware of their own place in the world.

1. Introduction

In recent years, teachers have been under the siege about the ways in which they meet the needs of diverse learners. While schools have become more varied, nations have been under the influence of globalization processes. One of the questions in the arena of teacher education regards the ways that teachers should be prepared to teach in a diverse and complex world. Schools are full of diverse learners, yet most of teachers have limited exposure to

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cultural diversity and a little knowledge of the world (O'Connor & Zeichner, 2011). Additionally teachers are unaware of influence of globalization on the life of a child (Grant, 1992; Ladson-Billings, 1994; Merryfield, 1991). In order to fill this gap, many universities in the United States have initiated cross-cultural teacher education programs to prepare pre-service teachers for diverse teaching environments and a complex world. Some scholars support the claim that having international or cross-cultural experiences may help teachers to live with harmony in diverse groups (Ference & Bell, 2004; Pence & Macgillivray, 2008; Wilson, 1982).

In this study, the researchers have explored experiences and cases of teachers who participated overseas student teaching project. Starting from the Eisner (1991) claim that the voices of teachers are very important sources in educational research. Thus, the researchers have aimed to hear what teachers state about their personal experiences and announce their reflections for others in order to contribute others that have not had cross-cultural experiences. Also, the results of this study are beneficial for curriculum designers, and teacher educators to provide and design field experiences with active engagement for prospective teachers.

2. Literature Review

The importance of overseas cultural immersion experiences has already been discussed in numerous studies (Barkhuizen & Feryok, 2006; Ference & Bell, 2004; Pence & Macgillivray, 2008; Stachowski & Sparks, 2007; Wilson, 1982). Previous studies indicate that overseas experiences help teachers to grow in both personal and professional life. First of all, international teaching experiences allow teachers to gain self-awareness "who they are" and to understand values and beliefs which underpin their teaching. Cushner (2007) asserts that "The experience abroad, regardless of the level at which it takes place, offers the individual a unique opportunity for intercultural development as it involves both physical and psychological transitions that engage the cognitive, affective, and behavioral domains" (p. 29). In particular, living with host families leads to learn more about culture, tradition, history, and social condition of host nations. Stachowski and Mahan (1995) claim that as the relationships with the host family develop, information about respective cultures is shared, stereotypes are dissolved and differences in lifestyle are examined and potentially adopted.

Having international experiences enable teachers to develop empathy and patience, enhance their multicultural understanding and made them "less prone to prejudge students based on cultural background, linguistic difference, or even learning disability" (Willard-Holt, 2001, p. 515). They become more mature, and begin to question their stereotypes of others as well as aspects of their own culture which had previously been unexamined (Cushner, 2007).

International field experiences also play an important role in preparing pre-service teachers as citizens of the global world (Mahan & Stachowski, 1995). Through these experiences students are able to see what happened in other countries, and how they educate their children. After engaging in international context, students became more vulnerable towards global issues such as poverty, peace, racism, equity, and increase their level of cultural sensitivity.

The framework of this study is draw upon Wilson's (1993) model on international education. According to this model, an internationally experienced individual can gain a global perspective, including substantive knowledge and perceptual understanding. Also, based upon this model, international experiences often lead to personal growth and new interpersonal relationships. Within this framework, the research questions of this study are following: 1. Do participants perceive cross-cultural teaching as an aid to self- development?, 2. Do

participants believe overseas experiences lead them to gain global perspectives?, and 3. What kind of learning has occurred within overseas experiences?

3. Methodology

The researchers have employed a qualitative research approach in this study. Since, the researchers have aimed to get in-depth information about topic. In this regard, some researchers have claimed that using qualitative research approach is the best way for getting detailed data (Lichtman, 2013; Mertens, 2009; Taylor & Bogdan, 1998). For this aim, the researchers, first, have employed document analysis technique by analyzing the description, curriculum materials, structures, and syllabus of the program. Following, the researchers have conducted semi-structured interview with the participants. The respondent group for this study consists of 4 volunteer teachers who participated in an overseas student teaching project at one of the mid-west university in the United States. Two participants went to Scotland; one went to New Zealand, and the last one went to England. The participants first took intensive preparation prior to going abroad. During the preparation process, they were taught about their host country/nation's living condition, culture, history, and education system. Then, they were assigned for their host nations' schools.

When the participants returned to their home, they were interviewed to gain deep understanding about their experiences. The semi-structured interview was the main instrument of this study; in this way "some questions will be developed in advance with follow-up questions on the spotlight of participants' responses" (Patton, 2010, p. 77). Interviewees were given the flexibility to expressing their ideas, opinions and concerns. The participants are interviewed face to face and one time. Each interview lasted approximately 45 minutes. After receiving permission from participants, each interview session was recorded and transcribed. By doing so, the researchers have collected the data about the participants' first-hand experience with their own overseas field experience. After gathering all data, the researchers have analyzed them based on descriptive viewpoint. At this point, the researchers have first determined the codes; next developed categories via merging the codes. Afterwards, the researchers have combined similar categories and finally gotten the themes. The researchers have additionally profited from the previous studies in the literature for naming the themes. Subsequently, the researchers have gotten some of the participants' speeches to the study as citation and/or quotation. In order to increase the reliability and validity of the data analysis procedure, the researchers have used "adequate engagement in data collection", and "rich, thick descriptions" strategies (Merriam, 2009). Some of the semi-structure interview questions have been shown below:

- What is your purpose to participate in overseas student teaching project?
- What are the advantages and disadvantages to participating in an overseas project?
- Did your experiences in the host country change your global perspectives? If they did, how?
- Did you observe any classes or teachers in your host country? If you did, what did you learn from that observation? How was your relationship with the teachers and students?

4. Results

The participant teachers stated that they have decided to go abroad on their own choice, because they have been curious about other countries. Their teaching experiences in abroad were their first international teaching experiences. According to the findings, four

main themes emerged from the participant teachers' responses: 1. Learning Instructional Pedagogy, 2. Comparison of Countries, 3. Developing self and relation, and 4. Global Thinking.

4.1. Learning Instructional Pedagogy

Within an overseas project, it is expected that participants engage in all teacher-related functions of the school in the host nation. Therefore, participants observed the classroom, spent time with teachers, examined extra-curricular activities and taught to children. From these experiences, the participant teachers have said that they had learned various instructional methods including classroom management, how they access children, how they integrate subjects in their curriculum and how they use activities. For example, one of the participant teachers has stated:

> *By the nature of going to a new culture and seeing different ways of teaching practices or performs you learn new pedagogy, you learn new classroom management styles, teaching philosophies and potentially you understand why certain educational philosophy may work for specific context (Participant 1, 2014, personal communication).*

The other one has claimed that "observing the classroom showed me different style of classroom managements; it demonstrated to me there was not one type of approach. Also it showed me how teachers chose their pedagogical strategies" (Participant 2, 2014, personal communication).

The participant teachers have noted differences in the instruction methodology. For instance, one of the participant teachers has expressed that "*In England, they were using a portfolio to evaluate students, but it was not necessarily graded. The important point for them was to give qualified feedbacks to children*" *(Participant 3, 2014, personal communication).*

In addition to learning about instructional methodologies, they had learned specific activities for specific courses. In relation to this issue, one of the participant teachers have said that:

> *I remembered that in one class, the teacher and her student had built a "time capsule" that was something kids take turn to go in and stand in to go back to a time in history. That was how they were teaching history. I thought it was a very clever and exciting activity that made the learning fun (Participant 4, 2014, personal communication).*

The participant teachers' responses have obviously demonstrated that they have learned many new approaches and techniques of teaching. All four participants believe that overseas teaching experiences have made them more flexible teachers who can consider various teaching strategies and classroom management styles.

4.2. Comparison of countries

As a result of international studies, the participant teachers have a tendency to compare America with host nations. Schooling is the most frequently compared issue among the participants. The participant teachers have reflected that students in the host nation were encouraged to engage with the art, music, dance, and drama. For instance, one of the participant teachers- who went to Scotland- has said, "*In Scotland students wore traditional clothing for festivals and they did special dance with special music. Read certain poems, they*

were keeping their culture alive" *(Participant 1, 2014, personal communication).* From their reflections, it seems like teachers and students are flexible and have more freedom in European countries than United States. One of the participant teachers has claimed:

> *Teaching in two countries is different. It took time to adjust to the condition. Here, education is based on the top-down approach and process driven curriculum. Teachers always explain what students should do at every steps of curriculum. In England, education was more-project driven, and children were not controlled by their teachers, they managed themselves (Participant 3, 2014, personal communication).*

The other participant teacher- who went to Scotland- has said:

> *Teachers have more freedom to be creative there. That country also had high stakes testing but not as much as in the US. It was not intense as in the US. Here teachers are under pressure like principals walk through to make sure everybody is on same page (Participant 2, 2014, personal communication).*

The other issue for comparison is the living condition in the two countries. Three participant teachers have made similar statements that people in Scotland and England enjoy their life. One of the participant teachers has asserted:

> *One thing I noticed going overseas, people enjoyed being in moment, being in present. They got together for dinners; they were hanging out and talking until feeling tired then they moved to home. Here, people are always looking at their watch like 'I need to go' (Participant 1, 2014, personal communication).*

Two participant teachers have reflected that in England and in Scotland parents and families have good relationship with each other. The participant teacher, who went to England, has said, "*Parents were creating parties, inviting teachers and they drank together. Here, there is a line between parents and teachers because of the professional life" (Participant 3, 2014, personal communication).*

With the exception of one participant, three participant teachers have claimed that there was a less structure curriculum compared to the United States. They have felt like both teachers and students benefited from this less structure curriculum, which allows teachers, and students have more freedom in daily classroom.

4.3. Developing self and relationships

The responses of the participants seem to indicate that cultural immersion experiences helped them to grow in personal development. Referring to cultural immersion experiences, one of the participant teachers has expressed "*It changes your identity to be open minded and culturally aware*" *(Participant 4, 2014, personal communication).* Another participant teacher has claimed:

> *By nature of term, you are working cross-culturally. You are putting yourself out of your culture and into a new culture that means out of your comfort zone. It is going to force you to develop yourself or you are going to be overwhelmed and immediately fly back to US (Participant 2, 2014, personal communication).*

Additionally, the participant teachers have made statements to the effect that study abroad helped them to develop awareness of possibilities and empathy. In this regard, one of the

participant teachers said:

> *One of the things I learned from community experiences is that just the different dimension is possible for issues that I have not consider certain ways previously. Like in New Zealand I participated in special needs home, as a part of service project I was completing there. It demonstrated me how New Zealand treat special needs citizen and how they worked to provide best care for them. There were many interventions for special needs children. It was a different experience for me to see how people empathize and help special need children (Participant 4, 2014, personal communication).*

Also one of the participant teachers has talked more about how relations with the host family and community helped him to socialize. He has explained:

> *If you live with a host family, you learn the culture a little bit more because you socialize and have extra feedback how to adapt yourself. If you are doing something incorrect that they, host families, might hopefully comfortable and confident enough with you to correct you and let you know 'by the way you do not want to do that because it is culturally offensive' or something along those lines' (Participant 1, 2014, personal communication).*

In sum, all participant teachers have claimed that overseas experience was a beneficial opportunity for them to learn more about themselves and others. They have stated that people were embracing them and making them feel like insiders. They have had strong relationships with host families, host teachers, and students in the host nations.

4.4. Global Thinking

As a result of the nature of international experience, the participants not only learned about them and teaching, but they also increased their understanding of global concerns and issues. For example, one of participant teachers has commented:

> *By nature of going into a new cultural setting, there is gonna be a more global educational style, seeing how certain issues may have been taught in your home culture and seeing how issues are taught in this new culture (Participant 1, 2014, personal communication).*

Within this global understanding, the participant teachers have made sense of the relations among the countries. One of participant teachers has stated:

> *What we do now in the United States is exactly what the United Kingdom did in the 80s. It is important to say how countries influence each other. We have always been globalized via media, but if you have communicated with people via media or Internet, they are surface level connections. Through overseas experiences, you can embody the culture (Participant 3, 2014, personal communication).*

Also the participants have asserted that they have very rich conversations with teachers in the host country about global issues. One of the participant teachers has said:

> *We have very rich discussions with teachers about culture, politics around the world. One of the things you realize that there are so many things to learn. If you are going to be a better global citizen, you have to continue educating yourself and reaching out the people (Participant 4, 2014, personal communication).*

In relation to globalization, the participants have claimed that media introduces Americans as very affluent persons who enjoy the life and have very comfortable living condition. Also, American movies show that people in the America are very good at technological skills. Therefore, the participants were faced with very interesting question in host countries. For instance, one student in England asks a question like "*What kinds of technological skills does your wardrobe have*", since this children saw in the movies that American people had multi-functional wardrobes.

5. Discussion

Based on the outcomes of this study, the participants have benefited positively as a result of overseas cultural immersion experiences. Participants express statements like

> *Every day I am really thankful that I had these experiences. It was the best decision I have ever made. My friend and I who were placed in same school, we are still talking about it. So many years later, 13 years later, we are still talking about it and I know we would speak until the day we die (Participant 1, 2014, personal communication).*

The outcome of this study supports Wilson's theory (1993) at many levels. The participant teachers have acquired substantive knowledge about a host nation's culture, including instructional techniques, human relations, living condition, and culture. The participants have made many comparisons between the US to the host nation. Not surprisingly, the participants mostly compare the educational system of two countries, followed by the living condition of the two nations. The findings show that participants develop a perceptual understanding that includes global awareness, becoming more open-minded person, the development of empathy and understanding the importance of communication and feelings of an outsider. In particular, they have talked about how media plays a critical role in global process. When the literature has been examined, some researchers have found similar results in their studies (Vaughn, 2015).

The other major finding of this study is that participants' experiences help them to become a better person. They are aware of more possibilities than before. Also, the participants develop cross-cultural interpersonal relationships with the teachers and host families, and their connections with these people are still continuing. These findings are consistent with the results of Stachowski and Sparks (2007) who found that student teachers with having overseas cultural immersion experiences develop themselves in terms of personal and professional growth.

The only challenge the participant teachers have mentioned is language. The participants often talk about the challenge of trying to understand the conversation. Even if these participants had gone to English speaking countries, they claimed that people's English accents and dialogues were different and hard to understand. This finding is coherent with the results of Chisholm (1994) who found that language is very important to prepare teachers for multicultural classrooms.

6. Conclusion

As a first-hand experience, the cross-cultural experience helps the participants, as teachers, to gain a meaningful perspective on other cultures and it helps to be aware of their own place in the world. Living in a different culture encompasses the learning about language, history, tradition, family relations and all the surroundings of culture.

The participants of this study reveal that overseas experience has value, and that especially for teachers, it is a very valuable experience. They have learned much about instructional methodology, how to access children, and various classroom management styles. When they share these new lessons, they also contribute to the education of those who are unable to go abroad. All of these new experiences are also valuable issues for teacher educators and teacher education programs, which may create opportunities for teachers to gain cross-cultural and overseas experience. The participants still see all challenges as very beneficial life experiences that enabled them to grow. They strongly recommend that everybody should participate in the same experience.

It is worth to mention that, even if this research reveals positive feedback about student experiences, there are several weaknesses and limitation. First of all, this research is a small size research so that the results are more specific to this group. Further study may be conducted to hear the voice of more teachers who went to other countries.

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Development and Validation of a Computer Education Curriculum Scale (CECS)

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Primary school curriculum in Turkish educational system has recently been revised based upon the basic principles of constructivism. During this process, the role of teachers and students, the teaching and learning processes, and the classroom environment have been redefined. This study has been designed to develop a Computer Education Curriculum Scale (CECS) in order to assess attitudes of primary school teachers towards the new curriculum and to determine and compare opinions of teachers on the implementation and effectiveness of the new curriculum. For this purpose, a 29-item Likert-type Computer Education Curriculum Scale was developed and administrated to 61 teachers working at primary schools from various cities of Turkey, who voluntarily participated in the study. And all participants serve in public schools, and have at least three years of experience as computer education and technology teacher. For data collection process, an online form of instrument was developed and collected data from participants by sharing it through online forms. As a result of statistical analyses on the survey data, 5 subscales were determined. These subscales are named as recognition of the new curriculum, course structure changes, identification of the teaching environment, application of the new curriculum, and role and contribution of teachers. Cronbach's alpha value of the whole instrument is 0.75.

Introduction

Based on the principle of that high quality education depends on a high quality curriculum, the developments in the fields of science, technology, and human rights and demands of individuals should cause certain changes in curricula (Güleryüz, 2001). Those new developments should be integrated into curriculum improvement activities (Gözütok et all, 2005). Additionally, a new curriculum should be developed in the light of the realities and goals of the country to which it is applied and the needs and demands of individuals in the society (Gözütok, Akgün & Karacaoğlu, 2005).Consequently, schools should be able to predict future trends (Gomleksiz, 2007).

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In Turkey, the compulsory primary education is eight years long. This process is both officially required and a right for every individual. This process is also very important because of the basic skills students gain during their primary education (Gürkan & Gökçe,2002).

The Turkish National Education Ministry is in the process of expanding its educational programs nationwide and improving the quality of the national education system by utilizing $600 million it has received from the World Bank. During this process, certain fundamental changes have been implemented in the educational system because of the European Union Integration Process. In 2004-2005 academic year, the new school curriculum was prepared and implemented at 120 schools in nine cities as a pilot project. The new curriculum is mainly based on a constructivist approach, student-centered learning, and thematic curriculum (Akbaba&Altun, 2004). Furthermore, the individual differences principle of the multiple intelligence theory is another base of this new curriculum. Gözütok, Akgün, and Karacaoğlu (2004) reported that a curriculum relying on similar theoretical bases and sharing as many tasks of practice as possible may create a more successful teaching-learning process.

Currently, constructivism-based education system is being implemented in countries such as the USA, Taiwan, Spain, and New Zealand (Mathews, 2000). Fosnot and others state that constructivism is much more of a learning theory than a teaching style (Hoşgörür, 2002; Duman, 2004). It is also understood as a learning philosophy (Yeşilder, 2004). According to the constructivism theory, it is necessary for students to be active inside as well as outside of the classroom. This theory also states that individuals construct their own knowledge based on their past experiences. Therefore obtaining new knowledge is not only a result, but also a source to produce new knowledge (Akar & Yildirim, 2004). In other words, the main function of learning for the learner is to make a connection between new understanding and an old one. During this process, the learner compares new knowledge to that previously held, then either accepts or refuses it (Cooperstein & Kocevar-Weidinger, 2004). The participation of students in these processes, both physically and mentally, can be called the construction of knowledge (Deryakulu, 2001).

It is known that the constructivist learning approach requires a specific learning environment and in this approach the tasks and roles of teachers and students change in different ways. In addition, different types of assessment are needed to evaluate different types of individuals (Bukova & Güğzel and Alkan , 2004).

The new primary school curriculum is based on the constructivism. Naturally, there are clear differences between the new and the old curricula. For example, cooperative learning is valued in the new curricula and this provides students an advantage of defined experiences through some hands-on activities. Multiple intelligence theory, project based instruction, problem based learning, learning by doing, learning by research, and cooperative learning are also emphasized in the new curriculum. To summarize, it is possible to say that in this process, both students and teachers have to be part of a collaboration in arranging learning environments and choosing activities, and students are encouraged to actively participate in teaching and learning activities.

Research studies show that the use of the constructivist approach can have great impact on students, and it yields students who are more motivated, more excited in the teaching and learning process, more able to apply science to real life situations, and more able to solve problems, than traditionally educated students. (Caprio, 1994; Baylor et al., 1997).

There have been several studies on the new primary school curricula that give some clues about its effectiveness in practice. In a study by Gomleksiz (2005), teachers claimed that the new curriculum is effective at a mediocre level when analyzed in terms of city variable. Teachers also stated that they knew about, adapted, and implemented the new curriculum. In another study by Bukova-Güzel and Alkan (2005), teachers explained that there can be some difficulties in selecting activities in connection with the new teaching-learning environment. Again, in the same study, the students found the constructivist learning approach attractive for their learning. Researchers stated that teachers consider themselves as sufficient in the constructivist learning environment, but the observations of researchers show that they were not as adequate as they claimed to be.

Plotting curriculum and evaluating its results is an important point necessary to understand the gap between theory and practice. Determining the problems while implementing curriculum and developing solutions is the key stage of the curriculum. It can be said that every curriculum needs this stage. The real life results of the integration of theory and practice is important for determining the effectiveness of the curriculum. For that reason, determining the effectiveness of the new primary school computer curriculum based on the views of the teachers should be considered as a very important process. The main goal of this study is to develop a scale to obtain the opinions of teachers regarding the effectiveness of learning processes, teaching-learning activities, and content, and also to evaluate the new curriculum in terms of city, gender, education level, class level, and classroom size variables.

Method

Population and Sample

The population of the present study is all Computer Education and Instructional Technology teachers (ICT teacher) in Turkey. Convenience sampling was used to select the sample of this study. All participants in this study are volunteers and willing participants. The participants consisted of 61 teachers working at primary schools where the new computer education curriculum was implemented. The major characteristic of these teachers is that they are working as a computer education and technology teacher in their schools. The distribution of the teachers in the various cities is as follows: Ankara(n = 17), Çanakkale(n = 2), Elazığ(n = 2), Erzurum(n = 10), Eskişehir(n = 3), Istanbul(n = 3), Izmir(n = 4), Konya(n = 4), Samsun(n = 5), Trabzon(3). Because several cities have only one participant, they are not given here and were named as “other”. The number of valid questionnaires received from the teachers was 61. Other demographic information was listed in Table1.

Table 1. Demographic characteristics of the study population (n=61).

	Number of students(n)	Percentage (%)
University graduated		
Anadolu University	2	3.3
Ankara University	5	8.2
Atatürk University	11	18.0
Ege University	3	4.9
Fırat University	2	3.3
Gazi University	6	9.8
Karadeniz Teknik University	4	6.6
Ondokuz University	5	8.2
Orta Doğu Teknik University	5	8.2
Selçuk University	4	6.6

Others	12	19.2
Gender		
Male	37	60.7
Female	24	39.3
Level (grade)		
1-5	5	8.2
1-8	7	11.5
4-8	26	42.6
6-8	16	26.2
Others	7	11.5
Undergraduate Program		
Depertment of Computer Education and Instructional Technology (CEIT)	56	91.8
Department of Classroom teacher	1	1.6
Department of Turkish Education	1	1.6
Others	3	4.9

Development of Data Collection Instrument

The existing literature was analysed by determining related articles on the new curriculum in Turkey, selecting a few scales in order to define the sub-scale of instruments, and getting some questions for the item pool. In the second part, expert opinions were taken to finalize the instrument for pilot testing. In the last part, validity and reliability evidence was collected and determined.

Analysis of Existing Literature

Literature relevant to the new Turkish educational curriculum was selected from the ERIC database, the Google Scholar tool, and library resources using such key words as scales, curriculum, attitude, and also Turkish terms. Although there are many scales on the new curriculum in different areas such as mathematics and science, there was no single instrument targeting computer education and technology teachers. When developing the new instrument, the Physical Education Curriculum Analysis Tool (PECAT) (which is related to the quality of the physical education program was analyzed. A study of Gomleksiz (2005, 2007) about views of primary school teachers on the implementation and effectiveness of the new curriculum was also consulted. Generally, it is possible to say that the attitude of teachers in different areas about the new curriculum is positive. Gomleksiz (2005) defined factors for evaluating the effectiveness of the new primary school curriculum. Bukova-Güzel and Alkan (2005) investigated teachers' attitudes regarding the new curriculum. Yangın and Dindar (2005) used a questionnaire with 18 questions under two factors in a study about the perceptions of teachers regarding the new curriculum. These two factors were related to the aim of science and technology lesson and the activities related with to the lesson. The study of Turgut and Ari (2006) showed that although teachers perceived themselves as not having enough information about the new program or curriculum, they had a positive attitude toward the new curriculum. Also in this study, Turgut and Ari defined two factors like previous study.

Taking Expert Opinion

To test clarity and content validity, the first version of the instrument was submitted to a panel consisting of three specialists in the area of knowledge of the instrument, who were informed of the measures and concept. One of the specialists was a ICT teacher, another an expert on measurement and evaluation, and the last an expert on Turkish Education. These specialists evaluated every item for its distinctiveness, understandability, and appropriateness

for the purpose. Essential changes were made in the statements based on their recommendations. These changes included both adding and omitting some items of the draft instrument, as well as fixing some grammar in many items. The tool finalized after adopting these changes. The feedback of experts was added at the end of the study.

Cognitive Interviewing

A cognitive interviewing procedure was used to define the problems about the items in the instrument. One ICT teacher was invited to this process. In this process, three steps were used; observation, listening, and direct questioning techniques. These techniques helped evaluate sources of response error in survey questionnaires (Wills, B. Gordon, 1999). In the observation process, some guiding questions were used, such as "where does he begin reading?" and "How long does he spend on each item and each part of instrument?" In the listening part, the participant was asked to share every thought and opinion while going through the instrument, but this part did not work as well during the interview because some participants preferred not to speak during this part of the interview. In the last part, direct questions were asked each participant in order to learn how to interpret the questions. After this process, a few items were revised with regard to clarity and understandability of items according to cognitive interviewing results. On the other hand, because of using an online form of the instrument, several changes could not be applied in the online form. Notes that were taken during this time were added at the end of the study.

Type of the Scale

The final form of the instrument consisted of 29-items using a five point Likert-type scale, where Complete = 5, A lot = 4, Medium = 3, Very little = 2, and Never = 1.

Content and Face Validity

It is possible to organize validity studies into three groups -- item validity, sample validity, and face validity. For item validity, an instrument must be relevant to the intended content area, and for sampling validity, the instrument must reflect the total content area. For face validity, the format of the instrument is of main concern (Gay, et al, 2006). Content validity of the instruments with the 29 items and 5 points Likert-type was provided by obtaining opinions from three experts.

Reliability of the Instrument

It is possible to test reliability by using several types of reliability, each of which is a different kind of consistency (Fraenkal & Wallen, 2005). Cronbach's Alpha Reliabilities were calculated to evaluate the homogeneity of the items in the pool.

Data Collection Procedure

It was not possible to collect date from teachers by going to their schools one by one. Rather, an online form of the instrument was developed in order to obtain data from the population. Some online forms that are frequently used by ICT teachers, such as Bote2003.com, Bilgisayarbilisim.com, were used in order to reach the potential target population. Respondents would complete the online version of the instruments.

Data Analysis Procedure

First, a data cleaning process was performed. Data were screened by scanning for four basic criteria: lack or excess of data; outliers; strange patterns in distribution. As a result of this process, there are no missing data, outliers, or strange patterns in the distribution tables. Data were then analysed by means of factor analysis with varimax rotation.

Results

According to Stevens (1996), in order to determine the correct number of factors and to attain the best fitting structure, the following criteria can be used: eigenvalues higher than 1.0, factor loading higher than 0.30. Before conducting the factor analysis of responses, the Kaiser-Meyer Otkin (KMO) measure of sampling adequacy and Barlett's test was calculated to evaluate whether or not the sample was large enough to perform a satisfactory factor analysis. Barlett's Test was 902,426, $p<0.001$. The calculated KMO was 0.549. In social science, the expected KMO value should be 0.60 or higher (George & Mallery, 2001). On the other hand, Field (2000) pointed out that it is usually required that the KMO value be larger than 0.5. In addition, the KMO value of the scale is rather close the rule of 0.60. So for these reasons, this KMO value indicated that sample was adequate to perform a satisfactory factor analysis.

Before conducting factor analysis, bivariate correlation among items was inspected in order to judge factorial structure. The level of intercorrelation among all variables was low; therefore it was expected that one or more factors would be present.

To detect maximum variance for each factor, principal components analysis (PCA) with varimax rotation was performed on 31 items from ICT teachers for a sample of 37 males, and 24 females. As result of PCA, 11 factors were detected. On the other hand, when the Scree Plot test was performed, the number of factor was judged to be 5 as seen in Table2. A new PCA with varimax rotation was then conducted. Three items in the scale were removed because of their low factor loading values. The total number of items was decreased to 29. As a result of this analysis, five factors best explain the factor structure of instrument. Six items in the scale made up 18.28% of the total variance on Factor 1. Five items made up 10.76% of the total variance on Factor 2. Four items in the scale made up 9.20% of the total variance on Factor 3. Eight items made up 8.51% of variance with Factor 4. The fifth factor is loaded with six items, and explains 7.27% of the total variance. These five factors explain a total variance of 54.63%.

An analysis of the rotated factor analysis results (see Table 2) reveals the character for each of the five factors with respect to their items. The 14th , 4th, 30th, 3rd, 16th, and 27th items loaded on the first factor, which was named "Recognition of new curriculum". The 5th, 7th, 8th, 9th, and 2nd, loaded on the second factor, identified as "Current changes in lesson". The 18th, 17th, 11th, and 31st loaded on the third factor, the "Recognition of educational environment". The 23rd, 1st, 22nd, 25th, 15th, and 26th items loaded on the fourth factor, "Application of new curriculum". The 20th, 28th, 21st, 32nd, 12th, 13th, 6th, and 10th loaded on the fifth factor, "Teachers' role and contribution". These factors were named with reference to existing literature.

Table 2. The results of Rotated factor analysis of scale; Mean, Standard deviations, Factor Loadings, and Communalities for CECS's items.

			Factor Loadings				
items	M	SD	1	2	3	4	5
S14	2,45	0,72	**0,85**	0,24	-0,10	0,01	-0,11
S4	2,57	0,95	**0,77**	0,17	0,06	0,05	-0,13
S30	2,67	0,86	**0,73**	0,11	-0,22	0,02	0,11
S3	2,58	0,83	**0,72**	0,02	0,17	0,12	0,10
S16	2,30	0,65	**0,66**	0,33	-0,03	-0,12	0,16
S27	2,67	0,86	**-0,42**	-0,01	-0,19	0,04	-0,19
S23	2,87	0,95	0,20	**0,82**	0,18	-0,09	0,13
S22	3,10	0,93	0,22	**0,71**	0,10	-0,08	0,11
S1	2,68	0,97	-0,17	**0,70**	-0,08	0,12	0,01
S25	2,90	0,86	0,21	**0,68**	0,11	0,07	0,26
S15	2,45	0,70	0,31	**0,55**	-0,19	0,21	-0,07
S26	2,72	0,87	0,19	**0,45**	-0,07	0,01	0,19
S5	4,03	0,99	0,05	0,18	**0,86**	-0,07	-0,01
S7	3,77	1,20	-0,09	-0,05	**0,81**	0,06	0,05
S8	3,80	0,95	0,10	0,05	**0,77**	0,08	0,00
S9	2,72	0,80	0,39	-0,13	**0,46**	0,28	0,18
S2	3,02	1,32	-0,05	-0,07	**0,42**	-0,07	0,24
S18	3,70	1,08	-0,04	0,27	-0,16	**0,79**	-0,27
S17	3,72	1,14	0,04	0,17	0,07	**0,78**	-0,28
S11	2,52	1,24	-0,04	-0,18	0,10	**0,74**	0,27
S31	2,53	1,08	0,07	-0,04	0,06	**0,74**	0,31
S20	1,77	0,70	0,10	0,19	0,24	-0,04	**0,65**
S28	2,42	0,65	-0,35	-0,14	-0,07	0,09	**-0,56**
S21	2,08	0,62	0,02	0,26	-0,05	-0,01	**0,50**
S32	2,67	1,08	-0,02	0,16	0,22	0,25	**0,50**
S12	3,25	0,95	-0,14	0,35	0,37	0,17	**-0,41**
S13	3,42	1,05	0,33	-0,02	-0,07	0,38	**0,40**
S6	4,32	0,98	0,19	0,33	0,29	-0,13	**-0,40**
S10	2,80	1,23	-0,29	0,29	0,20	0,15	**0,35**

Note: boldfaces indicates highest factor loading. Description of items found in Appendix A. factor 1 = Recognition of new curriculum; factor 2 = Current changes in lesson; Factor 3 = Recognition of educational environment; factor 5 = Teachers' role and contribution; Factor 4 = Application of new curriculum.

The alpha internal consistency coefficient that was calculated for the reliability of the scale of attitudes towards new computer education curriculum was found to be 0.75. In addition, for each factor, the alpha value was calculated. The alpha value for the first factor was 0.80; for second 0.71, for the third 0.77, for the fourth 0.80, and for the fifth 0.30. Numbers of items and Cronbach's alpha value for each item are given in Table 3.

Table 3. Cronbach alpha values for each subscale.

Scale	Number of item	*Cronbach alpha* (α)
Recognition of new curriculum	6	.80
Current changes in lesson	5	.67
Recognition of educational environment	4	.77
Application of new curriculum	6	.80
Teachers' role and contribution	8	.35
Total	29	.75

Discussion and Conclusion

The data of the study were collected using the new Computer Education Curriculum Scale (CECS) developed by the author. The five-point Likert type scale consisted of 31 items asking the teachers to rate their ideas about the CECS. Principal component analysis was performed. The KMO value of the scale was calculated as 0.55, and Bartlett's test was measured as 902,426 ($p< 0.00$). According to an analysis of results, five sub-scales were identified in the instrument. The sub-scales were named as Recognition of new curriculum, Current changes in lesson, Recognition of educational environment, Application of new curriculum, and Teachers' role and contribution, respectively. Cronbach's alpha reliability coefficient of whole instrument was measured to be 0.75. Cronbach's alpha reliability coefficient calculated for the four sub-scales varied between 0.35 and 0.80. According to factor analysis, the instrument explained 54.63% of the total variance. The percentage of explained variance is sufficient for interpreting the factor structure of this instrument.

For validity studies, content and face validity, and construct validity were examined. For reliability, the Cronbach alpha reliability coefficient was calculated. According to results from factor analysis, the CECS was found to be valid and reliable. Data obtained from this instrument will give detailed information from teachers about the new computer education curriculum. In light of this information, problematic issues of the curriculum can be revised.

The calculated KMO was 0.55 indicating that the sample was not large enough to perform satisfactory factor analysis for social science. On the other hand, it has been reported that for KMO when statistical information is between 0.90 and 1.00, the sample can be considered excellent, between 0.80 and 0.89 very good, between 0.70 and 0.79 good, between 0.60 and 0.69 average, between 0.50 and 0.59 weak, and when less than 0.50 it is not acceptable. In this study the KMO was 0.55, which showed that the size of the sample was weak. This KMO value is probably explained by the smaller sample size.

As a conclusion, A 29-item Likert-type Computer Education Curriculum scale was developed. The reliability of the scale as tested by Cronbach's alpha was 0.75. The scale includes five subscales. In further studies, a larger sample size would be helpful in overcoming some limitations of the present study.

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