High School Students' Proficiency Perceptions to the Usage of Technology Products at Physics Lessons

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ABSTRACT
The aim of this study was to determine the opinions of high school students' proficiency perceptions towards the technology products and their usage at physics lessons. Mixed method including quantitative and qualitative data collection tools was used for data collection. The study group consisted of 514 students studying at High Schools and selected in stratified sampling type. The proficiency perceptions of high school students related to what they identified as technology products and the usage of these products at physics lessons were collected via 5 point Likert type scale developed by the researchers. The Cronbach α reliability coefficient of the developed scale was found as 0.84. The analysis of the scale data was conducted via SPSS packaged software with descriptive statistics methods. To analyze thoroughly the students' perceptions related to the technology products and their usage, semi-structured interviews were conducted with 34 volunteer students who were among the same study group and determined at each school and at each class level. According to the results from the scale, although the students stated that they generally found their competencies to technology usage as good, the results from the interviews showed that the efficacy perceptions of students to these products were not only limited, also they did not use them effective enough in some subjects even poor or no knowledge or skill at all.

Keywords: Physics lesson, secondary education, student, technology product and its usage, self-efficacy

INTRODUCTION
The changes and improvements in technology not only affect business world but also at any point of our daily lives. While we live together with technological products such as visual media tools, video games, mobile phones, optical readers, remote controllers, mechanical and electronic toys etc., technology is included in education likewise and usage of technological tools in educational perspective has many advantages. Both traditional and new technological tools shape and accelerate the teaching process; they contribute to realize the educational activities.

In elementary education, Physics is a part of science lesson while in the secondary education Physics is a lesson which is established on conceptual bases with wide spectrum. Covering many fundamental and derived formulations, having inductive and deductive methods and setting an asset for using geometry and algebra skills, many students expressed that they perceive physics as a lesson heavily loaded with mathematics and that is the reason why it is hard to learn (Redish, 1994 cited in Örnek, Robinson & Haugan, 2008). In his studies examining the opinions about physics of high school students and teachers, Angell et al. (2004) stated that students defined physics lesson as hard to learn because of various notations such as experiments, formulations, calculations, graphics and at the same time conceptual explanations (Cited in Örnek et al., 2008). Physics lesson is considered as a purely numeral lesson so that it is thought that it is difficult to understand, learn and teach (Kolçak, Moğol & Ünsal, 2014), and most of the teachers teach Physics directly with formulations and it makes the lesson more difficult as making the students dealing with calculations instead of concepts. As a result, students have misconception about physics as they reconcile physics concepts and phenomena mistakenly. Some researches (Clement, 1982; Halloun & Hestenes, 1985) show that the hardship of physics education does not only stem

from the teachers and students, but not using the necessary teaching methods and sufficient technology during the education also affects it. The complex information presented at the physics lesson might be visualized (Kolçak et al., 2014) and with the help of various technologies they might be simplified and these techniques make students learn via living (Ramsden, 2002). It is stated that developing and using multimedia supported education activities for evoking the students' visual and intellectual bases affect students' success positively in teaching the acquirements of physics which is hard to understand (Harwood & McMahon, 1997; Kolçak et al., 2014).

Considering the students' increasing tendency of using technology and appealing their learning skills, many technologic products are using in physics/science teaching. In this context, it is highlighted that using proper education technologies such as IT products, Computers, Advanced Scientific Calculators and various teaching tools helps to realize the complete learning and constructive approach-based teaching activities, to appeal the students into the subjects of lessons and helps to increase the success levels of students (Gomes & Waits, 1996; Laughbaum, 2000). Trainings realized with computer-aided training software help to objectify and practice the science/physics concepts and enable some experiments to be done interactively with simulation applications via internet for which are difficult to create the suitable setting for applying in practice or buy devices for them (Altın, 2001; Fendt, 2004; Kiselev & Yanovsiky-Kiselev, 2004). In this framework, it is expressed that these kinds of applications (animation, simulation) realized with applets (Şengel, Özden & Geban, 2002) have more positive effects for perceiving many physics subjects such as displacement and velocity then the traditional laboratory applications. Besides, simulation methods carrying out by computer-aided trainings are more effective to attract the attention to science lessons then the other methods (Geban, Aşkar & Özkan, 1992; Hounshell & Hill, 1989).

We have encountered educational technological tools and computer-aided educational tools recently such as tablet PCs, smart boards called as interactive boards or electronic boards (Emre, Kaya, Özdemir & Kaya, 2011; Türel & Demirli, 2010) used in classrooms as in Turkey with the initiation of Fatih Project. Being interactive of the smart boards gives the opportunity to students and teachers to interfere the screen that means they are able to do changes during the lessons and save them (Erduran & Tataroğlu, 2009). Since the tools are relatively new, there is no persuasive in-depth knowledge from the teachers yet about their contribution levels and benefits to learning and teaching process. In addition, the studies showed that science and mathematics group teachers stated that using smart board positively affects learning environment by fostering the interest of students and making them more participative (Erduran & Tataroğlu, 2009). Controlled by touching on screen of the smart boards, it functions the same as using the mouse on the computers. Although smart boards resemble computers by the appearances usages, actually they have so many functions if they are used properly and effectively. Like other technological tools, while smart boards draw the attentions of students and make easier to learn from their perspectives, the students who enjoy learning via smart boards think that education technologies help them to learn new information and enable them to find a better job in future (Sünkür, Arabacı & Şanlı, 2012). Tablet PCs are among the devices gaining popularity and related to information technologies on which the students can take notes easily, draw graphics (Gök, 2012), access internet, listen audios, watch and record videos, read e-books and many other features (Shurtz, Halling & Mckay, 2011, cited in Aydemir, Küçük & Karaman, 2012). Having multimedia contents, tablet PCs make easier to all academic applications and exercises such as preparing lessons, home works, researches, scanning and designs (Gill, 2007). According to the latest researches, in case of using tablet PC especially at science lessons and other abstract lessons, the lessons become enjoyable, make the abstract concepts to be understood easily, maintain the retention on learning and increase the attention to the lesson (Aydemir, Küçük & Karaman, 2012; Daşdemir et al, 2012; Ellis-Behnke et al., 2003; Gorgievski et al., 2005; Fister & Mccarty, 2008; Bilen et al. 2009; Uzoğlu & Bozdoğan, 2012, cited in Özdemir, 2014).

While the above mentioned tools are widely and frequently used for educational purposes in some countries, the functions, importance and benefits of educational tools are ignored or are not effectively used for various reasons in other countries (Martin, Mullis & Foy, 2008; Mullis, Martin & Foy, 2008).It is known that integration of technology products to education in our country can not be fully realized. One of the reasons for this problem may be lack of awareness of that children and young people about using technology products for scientific purposes. Another important reason is thought to be the lack of knowledge and skills of teachers' in using technology products in their experimental studies. Although teachers believe that technology products using has contributed to science teaching, they prefer to use them with interactive board or projection device (Martin et al., 2008; Mullis et al., 2008). In this context, education technologies are determined as an investigation and research field, which tools are used how, where and how effective they are used are set the matters of questions (Alkan, 1997). When we examined the studies conducted in our country, there are researches about examining students' opinions and attitudes to the new technologies (Akgün & Yücekaya, 2015; Keleş, Öksüz & Bahçekapılı, 2013; Kurt, Kuzu, Dursun, Güllüpınar & Gültekin, 2013; Pamuk, Çakır, Ergun, Yılmaz & Ayas, 2013), the effect of

smart board to motivation (Akgün, Yücekaya, 2015; Elaziz, 2008; İşman et al., 2012; Koçak & Gülcü, 2013; Türel, 2011) and its effect on the success of students (Çoklar & Tercan, 2014; Gençoğlu, 2013; Kaya, 2013). It was seen that opinions of students and teachers were examined in the literature about the usage of Tablet PCs in teaching-learning environment (Aksu, 2014; Dündar & Akçayır, 2014; Küçükaydın, Bozdoğan & Öztürk, 2014; Özdemir & Bozdoğan, 2014; Uzoğlu & Bozdoğan, 2012). It is also observed that these studies are mainly carried out by primary and secondary school students and teacher candidates or teachers who are teaching these students. On the other hand, there is a research examining the perceptions of students on smart board in Physics lessons (Gürel, Olgun & Arslan, 2016). In addition, there was no research that examined the self-efficacy of high school students' using of technology products in their physics lessons. As in many areas of education, the use of more than one technology product (tablet PC, MS software, physics teaching software, scientific calculator, etc.) as well as a smart board in physics lessons will enrich the learning and teaching process from many aspects. In this context, in this research, it was aimed to determine students' level of knowledge about technological tools in physics course teaching, determination of competence perceptions and self-efficacy related with using technological tools in learning process. This study is important in this sense and it is thought that in the light of the results, this study will contribute on the usage of technology in education, especially on physics education by determining the important points to be paid attention and offering suggestions about the needs of students. The research problem of this study was "What is the level of opinions of high school students' proficiency perceptions to the usage of technology at physics lessons?"

METHOD

Research Model

This study was conducted in mixed method which is described as collecting data by integrating quantitative and qualitative approaches and presenting the collected data by analyzing and blending them (Baki & Gökçek, 2012; Creswell, 2014; Creswell & Clark, 2014,). Mixed method was used in this study to see the harmony and evaluate the answers in detail given to the measurement tool that was prepared for reaching out more people. For this reason, research pattern of this study is convergent parallel mixed pattern which combines qualitative and quantitative data enabling to analyze the data in a wider way (Creswell, 2014) related to the research problem.

Study Group

The students studying in Tekirdağ city, Süleymanpaşa Province in 2015-2016 academic years at High Schools of Science, Anatolian Teacher Training High Schools and Anatolian High Schools formed the study group. The sample of the study was designed selecting 20 students from each class as stratified sampling and concurrent mixed methods sampling (Baki & Gökçek, 2012). Some demographic information of the volunteer students forming the study group was shown in Table 1.

Table1. Demographic Information of Students

Study Variables	Variables levels	Frequency (f)	Percentage (%)
Gender	Female	294	57
	Male	220	43
School Type	High School of Science	82	16
	Anatolian Teacher Training High School	84	16
	Anatolian High School	348	68
Grades	9th Grade	156	30
	10th Grade	126	25
	11th Grade	157	30
	12th Grade	75	15
Having Computer	Yes	494	96
	No	20	4
Having Internet Connection	Yes	469	91
	No	45	9

Again, for the qualitative data collection process of the study, it has been worked with 34 volunteer students from group of 514 students. It has been paid attention to the inclusion of students from each school and each grade level while selecting the students in this group.

Data Collection Tools

Proficiency Perception of High School Students to the Usage of Technology at Physics Lessons (PPHSSUTPL) Scale

The scale was developed by researches aiming to get the proficiency opinions of high school students about usage of technology at physics lessons. Prepared in 5 point Likert type, the scale consisted of 9 items which were gathered under the single factor. The steps of scale were explained below.

Preparing the item pool: Related literature was reviewed by researchers, the measurement tools used in previous researches were examined and proficiency items were written for trial purposes by consulting the students' opinions. Five experts were consulted about the length, clarity and effectivity of items. Initially there were 10 proficiency statements about the usage of technology in physics teaching in the item pool (Yurdugül, 2005).

Content validity ratios and finding the indexes: Content validity of 10 proficiency statements in the item pool about the usage of technology in physics teaching was refined through a form. The item pool was restructured by taking advices and feedback into consideration.

The content validity ratio (CVR) of prospective scale form was 0.99 for five expert opinions. Averaging CVRs which left in the form, content validity index (CVI) was found as 1.00. As CVI>=CVR, content validity of the whole scale was statistically significant (Yurdugül, 2005).

Structuring prospective form: 10-item prospective form was prepared whose content and validity was confirmed. Yet, "I have problems using graphic calculator" item was removed from the scale because graphic calculator, using for data collection and drawing graphics of these data, was mistaken for normal calculator. Positive question items in the prospective form were evaluated as 1 "Strongly disagree", 2 "Disagree", 3 "No idea", 4 "Agree", 5 "Strongly agree". The negative question items were evaluated as 1 "Strongly agree", 2 "Agree", 3 "No idea", 4 "Disagree", 5 "Strongly disagree".

Besides, there were 7 closed ended questions (gender, age, type of school, household income status, and internet connection/computer in the house) in the form to get the demographic information of participants.

Applying the prospective form: 10-item prospective form was applied to 20 students and was tested the clarity of the items. Then, it was applied to 61 students form 9^{th}, 10^{th}, 11^{th} and 12^{th} graders.

Calculating the structure validity: Exploratory and confirmatory factor analyses were carried out to determine the structure validity of the scale.

Exploratory factor analysis: Kaiser-Meyer-Olkin value, which identifies the reliability of sampling, was found as 0.903. The scale consisted of 9 items which were gathered under the single factor. Explained by this factor, total variance was 46%. The values of factor loadings varied between 0.539 and 0.782.

Confirmatory factor analysis: As a result of confirmatory factor analysis, it was found that chi-squared/df = 96.28/27 = 3.56. According to the analysis, fit indices were calculated as GFI=0.96, AGFI=0.94, NFI=0.97, NNFI=0.97, CFI=0.98, RMSEA=0.068.

Reliability calculation: The reliability of scale was calculated as 0.84. There was no reverse coded items in the scale and total scores determined as the results of scaling ranged from 9 as the lowest, to 45 as the highest score.

Interview: The interviews were conducted to get the opinions of high school students about the usage of technology at physics lessons. 34 students studying in different schools and grades were interviewed on the volunteer basis. Firstly, a question pool formed by semi-structured questions was composed by the researchers. Then, three experts were consulted by selecting the proper questions from the pool. According to the opinions of experts, the interviews were conducted with 9 questions. The following questions were asked in the interviews;
1) What comes to your mind when technology is said?, 2) What comes to your mind when Information communication technology is said?. 3) Do you use technology at the lessons?, 4) Do you use smart boards at physics lessons? How do you use it?, 5) Do you use software at physics lessons? Probe: On which stages and how do you use it?, 6) On which purposes do you use information communication tools? Probe: Do you use them while doing your homework? How do you use it?.

Demographic Information Form: The form was composed by the researchers to have the demographic information of the students participated in the research. The questions were asked to find out the students' genders, school types, grades and whether or not they have computers and internet connection in their houses.

Implementation Process: The research was started with developing ***PPHSSUTPL*** scale. The scale was applied to 514 high school students after validity and reliability analyses. After applying the scale, semi-structured interviews were conducted with 34 volunteer students among 514 students to get the in-depth knowledge. The interviews were recorded to refrain from lose the data and check/use them again during the analysis.

Data Analysis

Determining the proficiency levels for technology usage of high school students, the scores gathered from ***PPHSSUTPL*** scale were shown in Table 2 with options used on evaluating the scale and score intervals.

Table 2. The Evaluation of Scale Data Based on the Options of Scale and Score Intervals

Options	Scores	Score Intervals
Strongly Agree	5	4.20 - 5.00
Agree	4	3.40 - 4.19
No Idea	3	2.60 - 3.39
Disagree	2	1.80 - 2.59
Strongly Disagree	1	1.00 - 1.79

For data analysis of ***PPHSSUTPL*** scale, SPSS-PASW Statistics analysis program was used with conducting descriptive analysis. The average and standard deviation values of each one of the items were calculated.

The interviews used for qualitative data tool were transcribed in to a Word document by the researchers. While analyzing the data, open coded system was used for determining the codes and sub-codes at first, then inductive analysis method (Merriam, 2013; Patton, 2014) which was constituted the themes was adopted. The data obtained from the both data collection tools was organized in an integrated way and presented in the findings chapter. In order to support the findings and comments from research analysis (Merriam, 2013), the direct quotations were excerpted from the semi-structured interviews during the implementation process.

FINDINGS AND COMMENT

Analysis of the qualitative and quantitative data collection tools that were used within the scope of the research problem have been gathered and presented in this section.

Technology perception

During the interviews that had been conducted with the students, answers were given by students in order to set forth how they perceived technology, and it was found that great majority (f:15) of the students defined technology as “an electronic device, tool that facilitates our life”. While some students (f:7) have defined the technology as a tool to reach the information, and as a communication tool, some students (f:8) have stated the technology as a communication device that provides one-to-one meeting, so that smart telephone is conceived by these students primarily when technological device is mentioned. Furthermore, while great majority of the students (f:28) have stated smart telephone, computer as technological device one each primarily; it has been ascertained there were some comments such as “S31: I do not consider the devices such as refrigerators, TVs as technological any more”. Quotations from the expressions of the students regarding definition of the technology are stated below:

S01: Devices and information, developing, facilitating the life, meeting needs.
S08: The thing that can do anything at any time whatever I want.
S09: Tools manufactured by people practically in order to increase welfare level of the people.
S14: Innovations that facilitate the life.
S18: Electronical devices that facilitate the life.
S05: They facilitate researching; we are able to find anything at any time we want.
S25: To research, access information, we can take advantage of it, we can learn.

Competence perception related to technology using

Data that was acquired from the ***PPHSSUTPL scale*** which had been applied to determine proficiency levels of the high school students regarding usage of the technology at physics lessons, who have defined the technology as the tools that facilitate the life in general, have been seen in the Table 3 below.

Table 3. Descriptive statistics of the proficiency perceptions of the high school students regarding usage of technology at physics lessons

Items		*M*	*SD*
I01	I have no problem for using of the Interactive (Smart) Board.	3.98	0.96
I03	My skills are adequate for using of the MS (Microsoft) Software in the computer.	3.90	0.94
I07	I prepare my homework easily by using appropriate software.	3.87	0.96
I10	I am able to use the technology in the lessons productively.	3.82	1.01
I09	I know functions of the Information Technology (Information Communication)	3.76	0.93
I08	I make calculations easily by using appropriate software.	3.65	0.95
I05	I do use scientific calculation machine (having keys such as Sin, Cos, Log. Etc.) easily.	3.39	1.14
I02	I am qualified to use Tablet PC within the activities of physics learning.	3.28	1.16
I04	I use physics learning software conveniently.	3.22	1.03

According to the results that had been acquired from the scale of ***PPHSSUTPL***, it was ascertained that students have deemed themselves at "I agree" (*M*=3.65) level related to their technology using. According to the results from the scale, although total average of the students was at *M*=3.65 level and while 18 of them deemed themselves were sufficient at computer concerning usage of the technological devices during the interviews conducted with the students; 16 of them deemed themselves sufficient for using of telephone. Students, who had indicated that they used computer and telephone for using of the technology, had stated that they used computer mainly for the purposes of to make researches through search engines over the internet, to understand better the subjects taught in the school, which they could not learned, to listen course lecturing from different web sites, to play game and to enter into social media sites. There are some quotations from the statements of students below:

S18: "I use it either for homework, or research and knowledge acquisition; sometimes I play game as well."
S23: "Mobile phone is handy I am able to access easier."
S05: "I am able to make any research from mobile phone what I want, I can talk to my friends."
S11: "I write directly to the search engines and it comes in view."
S30: "I use mobile phone frequently, because it is with me every time."

As it has been seen from the explanations above; students stated that usage frequency of the telephone has been increased since using of telephone is easier, and many things that the computer has made can be made via telephone as well and easy to carry feature of the telephone.

Competency to use technology in lessons

And again, as it has been seen from the Table 3, students answered as they agree to the I10 item *"**I am able to use the technology in the lessons productively**"* at (*M*=3.82) level. During the interview, students who deemed themselves at adequate level regarding "I use the technology in the lessons productively", thought the smart board directly as a technological device in the lessons, and this was seen in the expression as well S10: "Since there are smart boards now, they have also been included in the technology directly, we have already taught our lessons and therefore we use technology". During the interview, while students have stated only smart board was used (f:34) as technology usage in the lessons, in the subsequent sections changing of the usage types and durations of the smart board at Physics lessons have been specified.

Students, who stated the smart board was used in many lessons in the interviews, have indicated that it was used since it provided facility by reflecting of the lectures and questions visually. Sample student expressions have been seen below:

S03: "We have been using the smart board mainly for visuals and some drawings, since writing and erasing is more comfortable".
S09: "We have been learning lessons mainly on the smart board; there are pdf formatted publications and we have been solving questions upon them".
S14: "Directly smart board; generally at Physics lessons and other lessons you may play video regarding the questions that were saved by the teachers in advance; and so forth some teachers show pictures by downloading during the teaching of the subject. They are able to prepare tests or teachers are able to make copy-paste, prepare visuals and teaching of the lessons upon the smart board is more convenient".
S28: "Each teacher does not use it; we follow the lessons through presentations during some lessons (there are book pages in the smart board) (purposed for learning of the subject) Yes, we have been watching videos, there are photos. There are also some lessons that we have not used it either".
S29: "We do not go on the internet; there are pdf files in the smart boards; there is information and learning; learning of the subject. First the teacher lectures the subject on the board, if there is any issue deficit according to him/her; we look books from the smart boards. Course books have also been uploaded".

It has been seen from the explanations that technological devices are used mainly in order to support traditional lecturing and to add some more visual quality and to facilitate it.

As it has been seen from expressions made by some (f:10) of the students such as; S9: "I have never done homework by using technology"; S32: "We have never prepared any homework, performance from physics lesson"; S33: "Homework is not given at Physics lessons toward using of technology, frankly an appropriate homework has not been given.", students have not done homework toward using of the technological devices productively.

Competency of smart board using

When the Table 3 has been examined, it was observed that answers of the students to the item **I01: *"I have no problem for using of the Interactive (Smart) Board"*** were at the level "I agree" (*M*=3.98). During the interviews that were made by the students mutually; while all of the students indicated that they use smart board as the most important technological device; most of the students (f:26) deem themselves as adequate and some of them (f:8) deem as partially adequate. Some quotations from expressions of the students toward using of the smart boards are seen below;

S14: "Sure I am adequate enough to apply the issues taught in the lessons".
S19: "I am able to use and we may write as well, it is already enough."
S16: "Yes I may use it, as required."
S31: "Yes, sure I am inadequate since I have not used it continuously, but I may use it enough as the others, but I am not adequate completely".

Additionally, when students have been asked during the interviews how they learned the smart board, some of them indicated that (f:18) they learned by observing and simulating the teacher; few (f:5) stated that they learned by guidance and commands of the teacher. Furthermore, some of the students (f:9) stated that they learned by taking advantage of its similarity to the computer.

A great majority of the students (f:21) indicated that using of the smart board was realized in the physics lessons, and some of the students (f:5) stated that it has been sometimes used. Besides, some students (f:8), who stated that the smart boards had not been used, were ascertained during the interviews. It was remarked that (f:9) the smart board had been used mainly in order to lecture the courses upon then pdf formatted ready to use books; and (f:12) for the purpose of seeing questions from different sources. Expressions of the students regarding how the smart board was used in the physics lessons have been provided below:

S27: "Textbooks were loaded; we have been uploading textbooks and auxiliary books for example, and we have been solving questions from them as well."
S30: "Generally for solving of the problems".
S07: "It is like this; the teacher uploads textbook in the program; we open the book loaded in the computer; there are blank sections, missing sections in the textbooks, we fill in the blanks through the board."
S22: "Rather the teacher comes and opens the subject on the computer that she/will lecture; we solve questions on the board."
S29: "We mostly solve questions, subject is lectured from there; we do not use it for any other purpose."
S09: "There is pdf format of the publication and we have textbook, and in the same way we follow from the book and solve questions. The teacher explains us on the board upon the question."

As it has been observed from the sample expression below; some part of the students (f:6) have opinion that smart board has created advantage for them, since ready figures and questions are displayed on the board and this issue especially enables them to solve more questions.

S30: "It is especially useful at Physics and mathematics; because there are many figured questions and we do not waste time by drawing it. Instead of 5 questions, we solve 15 questions and it is advantageous for us."
S01: "Especially there is no problem such as chalk, board marker is consumed".

In addition to the expressions above regarding usage of the smart board, students stated that the smart board is used to write (f:10) as a normal board; to watch video (f:5) and to view slides (f:2) as well.

Competency of tablet PC using

According to the results that were acquired from the ***PPHSSUTPL*** scale; responses (*M*=3.28) given by the students to the item I02 *"**I am qualified to use Tablet PC within the activities of physics learning"*** have been determined as "I do not have any idea" level. During the interviews that had been made with the students, most

of the students stated that tablet pc was not used in the lessons. It was also ascertained that only some students used it for writing purposes instead or writing on notebook.

Competency of information communication technology knowledge

In the implemented ***PPHSSUTPL*** scale, it has been seen that students deemed themselves at "I agree" level (*M*=3.76) regarding the item I09 "***I know functions of the Information (Information Communication) Technology".*** During the interviews that were made with the students face-to-face, it has been observed that some of the students (f:12) defined the information communication technology as to obtain information primarily from computers and smart telephones through internet and some devices such as TV and radio afterwards. Again it was determined through the following comments, some of the students had declared that they did not have adequate knowledge regarding the informatics; and (f:8) perceived the social communications that had been performed primarily upon smart phones and computers afterwards upon internet, as the information technologies when examining their statements as (f:4) S29: "Is the Informatics as a thing such as to reach something; I mean I have never heard it."; S4: "Actually it doesn't make any sense, again it is a branch of technology and a network that was established on the communication… anyhow it doesn't make any sense."

Students stated in the interviews that they usually used (f:14) computers and smart phones as information communication devices while they obtained information by making research upon internet and to learn concepts that they have not known. Furthermore, they stated that they have used them in order to make information retrieval (f:10) and to observe the subjects upon internet, which they could not learn sufficiently in the school, and to repeat the subjects (f:10) as well. Moreover, as seen from the statements below, it was understood that students used the information communication devices to obtain encyclopedic knowledge (f:13) regarding their homework.

S10: "I mean, too much research homework had not been given concerning physics, and lastly I made homework about particles of the atom, I performed slide presentation, researched from internet and did it, I had researched subatomic particles in my previous homework."

S18: "It has been given but it is encyclopedic knowledge for information purpose."

Competency of software programs using

It has been understood that they participated in the opinions of the ***PPHSSUTPL*** scale I04 "I do use physics learning software conveniently" (*M*=3.22) at the "I have No Idea" level. During the interviews that had been made with the students, as it has been indicated in the explanations above, the smart board had been used only as a board and as an alternative to the blackboard and had been defined as device provides saving of time.

Furthermore, it has been observed that they responded to the I08 Item of the ***PPHSSUTPL*** scale (*M*=3.28) "I make calculations easily by using appropriate software" at "I agree" level and to the I05 Item "I do use scientific calculation machine (having keys such as Sin, Cos, Log Etc.) conveniently" view at "I have no Idea" (*M*=3.39) level. During the one-to-one interviews that had been made with the students, only one of the students stated that she/he had used scientific calculator. Again, it has been observed that students responded to the I03 Article "My skills are adequate for using of the MS (Microsoft) Software in the computer" (*M*=3.90) and I07 "I prepare my homework easily by using appropriate software" (*M*=3.87) of the ***PPHSSUTPL*** scale at "I agree" levels. However, opposite of scale results, it has been observed that software programs were used in the physics lessons scarcely (f:4) and some of these usages were realized for once only, as stated by the expressions of the students below.

S31: "I think we had done it once; since it was too efficient we decided to make experiments with our methods. We watched virtual experiments only."

S04: "We have been using only StarWord software for the solutions; it is simple software and it is an easy program for drawing purpose."

Furthermore, based on the expressions below; it has been observed that since many of the homework that had been requested for preparing of presentation, hence they knew using of limited programs: S31: "Here it is Word, Excel, PowerPoint; since I made many presentations I mean I am pretty good at them". S16: "Telephone, internet, computer; Operating systems – but not too much. Office programs- yes they are, for homework".

Suggestions for using technology in physics lessons

Additionally, in the interviews that had been made with the students, they were requested to provide their proposals for usage of the technology at Physics lessons, if any. It has been observed in the explanations that were made by the students as they could not use technology at their physics lessons very efficiently. Some of the comments given by the students are as follows:

S09: "In my opinion the subject that we treated is too numerical, it hangs in the air, we do not make practice, it remains in theory exactly, as I see it".

S11: "…. If there were simulations lecturer would have been better, but unfortunately physics syllabus is too intensive and teachers have difficulty to keep up them and could not allocate time for such kind of things… they all remain in theory… Formulas are given, some questions are solved, and we are obliged to pass it".

S14: "In fact there are many things to be learned in physics, but due to the examination system that we are subjected, we do not interest with the learning of physics too much… we try to learn how we will solve the subject. Such kinds of things cause waste of time".

S19: "I would like more usage of smart board in my school, and I wish using of it more efficiently in some physics lessons based on visual issues such as optics. Our teacher does not do this. Abstract subjects are difficult to perceive. I have difficulties to understand them personally; I think I may understand better through more visual issues and videos, in terms of understanding of the logic; and not to memorize them".

S33: "In my opinion, we should use software programs and Java programs as you have said. We have smart board and according to me it is appropriate for this issue; however we may not use due to intensive syllabus, but we should use it more often and we should reflect this".

When the above specified expressions were taken in to consideration, it has been seen that students have opinion usage of the technology more efficiently, especially for abstract concepts since they are difficult and to make them more understandable. Due to examination system and intensive education programs, students cannot take advantages of these devices and they state their deficiencies in terms of learning through their explanations as "we do not interest learning of physics. (…) We cannot learn the subject, we try to learn how solve the problem."

DISCUSSION AND CONCLUSIONS

Alongside the today's education that lifelong learning approach has been taken into basis thoroughly, changes and improvements at the information technologies have increased the importance of the information technologies that are used in the education herewith. These changings and improvements that have been experienced in the technology cause changing and improving of the individuals in other words increasing of their technology oriented knowledge and skills, as well as transferring of them into the daily life even more. Students, who are at the center of the learning approaches, have been expected to be interrogator, researcher and explorer individuals by providing active participation to learning. In this direction, alongside the awareness levels, students should have knowledge and skills at high level for using the education technologies. In this study that was performed within this context, it was observed that students generally perceived their proficiency of technology usage as "I agree" level and, regarding how they perceive technology, students generally identified technology as tools that facilitate the life. In the study that Herdem, Aygün and Çinici (2014) had performed with the 8th grade students, it was determined that students had an idea that electronical devices were a must-be when technology was mentioned. In addition, most of the students have considered one-to-one communication between the people when communication was mentioned, and in terms of technological devices students enumerated put smart phones and computer primarily. Though, technology has been defined not only as the electronical devices but also application of tools, materials and methods by improving them, which were manufactured for fulfilling of human needs and producing of solution (Kaya, 2006; Reiser, 2007). Hence, while enumeration of the smart phones, computers and similar derivative tools by the students as the technological devices, indicates efficiency of the accessibility (Herdem, Aygün & Çinici, 2014), it also indicates that students do not consider other products out of these ones, in order to include them in technology class. Again, enumeration of the smart phones and computers by the students primarily in the education and especially at Physics education can be taken in to consideration, as they have perceived information retrieval upon internet as education applications. Though, the education technology that has been focused on learning includes many processes such as information, storage, method, technique and mutual interaction (Alkan, 1997; Kaya, 2006; Uşun, 2006).

Results that were obtained by the student interviews have indicated that Smart boards, which were come to the agenda through Fatih Project and distributed many schools have been considered by the students as the heavy-duty technologic devices, which are used at Physics lesson as well as other lessons. However, it has been understood that usage of smart boards are considered dominantly as they provide time saving and remove the problems such as dust, ending of board marker, caused by the other boards. Again the students have indicated that the smart board has been used mainly for the purposes of lecturing, providing visual materials and screening of a written material by reflecting it. It can be said that the reasons for not using of the smart boards at physics lessons without serving its purpose, have been caused mainly by viewpoint of the teachers and their proficiency levels. However, students who said "***I do not have any problem for using of the interactive (smart) board"*** (*M*=3.98) stated that they learned usage of smart board by simulating their teachers. Thus, students are capable to use the smart boards as their teachers have known and used them. When actions that were realized and were not realized by the teachers have been taken in to consideration, the importance or the teacher comes in to the

picture, in terms of attitudes of the students. Furthermore, the examinations such as Undergraduate Placement Exam and Transition to Higher Education, are an important problem of our education system. A perception of necessity to be prepared these examinations by multiple choice test method was improperly formed in teachers, students and their families. Because of the improper perception, students think that they can learn the subject by doing multiple choice test questions instead of learning the subject. Therefore, students aim to do more test questions and do them faster when they prepare for the exams. It can be said that it has affected usage of the technology more efficiently during the lessons. It has been understood that teachers perceived interactive boards for reflecting and displaying of the ready presentations and documents on the board (Pamuk, Çakır, Ergun, Yılmaz & Ayas, 2013), and thus they realized such kind of usages. It has been observed in the performed studies that this situation was caused by not providing sufficient training in our country for the teachers, who realized this education and students subsequently (Gülcü et al., 2013; Keser & Çetinkaya, 2013; Pamuk, Çakır, Ergun, Yılmaz & Ayas, 2013; Somyürek, Atasoy & Özdemir, 2009; Türel, 2011).

It has been observed that students, who were partially adequate about smart board, did not realize usage of Tablet PC at Physics lessons as well. One of the reasons regarding for not using of tablet pc was that they were not distributed to all classes as well as their usage was not realized even in the distributed classes. Hence it has been seen that tablet PCs which their purposes are technology supported education do not serve to their purposes. Teachers have more negative approach for usage of the tablet PCs in comparison with the usage of smart boards and they indicate that they are insufficient in terms of their received education (Dağhan et al., 2015), these opinions of the teachers have seen in their lecturing processes as well. The study that was performed by Pamuk et al. (2013) has indicated that teachers require training, either pedagogic or professional point of view, regarding usage of the Tablet PC. Altın and Kalelioğlu (2015) determined in their studies that both teachers and students were in negative attitude regarding usage of the tablet PCs. The idea of tablet PCs were not used for educational purposes showed parallelism with our study.

In today's world, making of trained person and equipped with skills such as reaching the information, gathering of the information, for evaluating of the information, representing of information and establishing communication is very important. In the context of this research, while students have defined the usage of information communication technology as to obtain information only upon the internet, it has been understood that they were not informed about reaching to the information, storing and evaluation of it as well as and using of the information for mutual exchange in a group and especially usage purposes of the information in the education (Kahyaoğlu, 2011; Wellington, 1985). Furthermore, it has been ascertained that students perceived information communication technology as to establish one-to-one communication among the persons by considering smart phones primarily, as they did in the perception of the technology. It has been determined in the study that was performed by Sarı and Altun (2015) that students perceive the technology related to teaching of mathematics by their class teacher as the projection device and computer and they prefer usage of interactive education web sites as well as ready presentations and materials (source books and questions) from internet. It has been evaluated that course of actions of the teachers affected thinking of the students in the education process as well.

Again another impressive conclusion is that the students are not aware from usage of simulation type programs, which facilitate the concretizing the abstract concepts and facilitate learning at the Physics lessons and they are not aware even existence of such kind of programs. Though, while simulation type software programs remove hazardous situations and decrease costs, they provide bringing of some physical situations at visual situations especially. At the same time they provide possibilities such as obtaining of the students and teachers quick results, when they focus on the subject, as well as graphic drawing, data collection and immediate amendments (Kim & Hannafin, 2011; Newton & Rogers, 2003; Osborne & Hennessy, 2003). Furthermore, it has been ascertained that students have not had adequate knowledge and skills about many software programs that have been used at the physics education. It has been observed that students use some MS Office programs such as PowerPoint and Word when they prepare their homework, in addition to limited smart board usage in the schools. It has been determined in the study that was performed by Gürcan (2008) that student perceive that they see themselves as active in using the MS program. According to the obtained findings of the research, it has been understood that effectiveness such as graphic drawing and calculation with simulations were not implemented by the teachers; thus students did not have efficacy levels for these applications. It was an important outcome that although students have negative experience and insufficient information, they are in need of using education technologies such as visual experiments, some software programs, simulations especially for learning of the abstract concepts and providing of permanent learning.

In accordance with the obtained results, especially teachers are required to orientate students more efficiently for using of the technological devices. Again, it is unfolded that teachers should provide more active usage of

technological devices and software programs, both in the lessons and homework they have given to the students; yet it is obvious that first teachers should be educated with undergraduate education or in-service training. Furthermore, it should be aimed to make the syllabus suitable for performing of more applications and to educate teachers and students as more sufficient individuals at the present day through the devices beyond traditional expression and learning. It is thought that it would be beneficial for students to be informed about the nature of physics and the relationship between physics and technology subjects in order to be able to overcome the incomplete knowledge and misperceptions of the concept of technology. This study is limited to the opinions of the students in the district center of a province and comparable results can be obtained by carrying out similar studies in other provinces. In the context of evaluating technological devices and products for scientific purposes in Physics teaching, it is suggested to carry out studies investigating the effects of technology supported experimental training activities on students' self-efficacy opinions of their technology using.

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