Perceptions of Geography Teachers to Integrating Technology to Teaching and their Practices

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Abstract

In present study the objective has been to manifest perceptions and practices of geography teachers towards integrating technology to teaching geography. In 5 different types of schools within Nevşehir (Turkey) city center, a total of 22 geography teachers volunteering to participate in the research were included in this study in which data were collected via semi-structured interview form during 2015-2016 academic year. Descriptive analysis method was employed to analyze obtained data. Integrating Technology to Teaching approach developed by Maddux & Johnson (2006) was adopted in the analysis of technology practices of interviewed teachers. In the conclusion part of the research it was identified that participant geography teachers possessed insufficient level of knowledge on integrating technology; a vast majority of teachers (16) performed Type I practices that referred to using technology; a small portion of teachers (6) performed practices that could fall into Type II dimension and five out of these six teachers practiced model and replica designs to visualize the topic; one teacher in his/her practice transferred the material (photograph) prepared as a teaching material to computer program for future use as data.

Keywords

Teaching Geography, Integrating Technology, Using Technology, Teaching Material

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Etymologically connected to the Indo-European language family the term technology has originally started to be used in the 19th century. Since that age scientific and technological products have gained prominence in daily life which became relatively easier, particulary in countries that experienced the Industrial Revolution. Access to technology in education institutions has been a substantial factor to enrich and change the teaching process (Çoklar, Kılıçer & Odabaşı, 2007). Arguing that education technology dates back to the time when the first human being asked him/herself the question "How can I teach this?" Çilenti (1995) draws a link between technology and "implementation of education" that relates to the second step of program development process in which individuals are provided with the means to reach special purposes. From this point of view, Çilenti defines education technology as a discipline probing into the process that allows the students to reach the goals defined in the education programs (Seferoğlu, 2014:3). Education technology can be defined as the use of technology in order to reach the defined goals and create healthy learning environments through education and benefit from technology to solve the problems in teaching (Demircioğlu, 2014:9). The relationship between teaching and technology has strengthened when the necessity of learning by doing and experience perception has developed on the basis of an effective learning environment that would address to different human senses. Hence in parallel with the higher number of senses are addressed through teaching, education becomes further effective and the learning process can take place in a quick and permanent manner (Çelik, 2007: 29).

In addition, technology in teaching process renders a remarkable contribution to create healthy learning environments. According to Alkan (1997) the contributions can be listed as:

- Liberty
- Reaching the information and recourses at first hand
- Provision of equality of opportunity
- Increasing the variety and quality
- Developing creativity
- Triggering autonomous learning
- Reproduction of the teaching processes in order to be used in different times and places
- Productive and fast teaching

"Using" and "integrating" technology is different from one another. The use of technology in classes does not necessarily mean being integrated (Koehler & Mishra, 2005). Using technology refers to the activities that can impart information to students. These technologies consist of activities such as informative web sites, PowerPoint presentations, slide shows. In such uses, student interaction is none or negligible. On the other hand technology integration requires students' active participation. Interactive software and web sites are rich in terms of user/students interaction and they allow the learner to understand the subject better (Matheison, 2011).

International Society for Technology in Education (ISTE) has defined technological integration as "the inclusion of technology to the process as reachable as other educational tools by making technology a part of educational functions to increase learning in a significant content or in an interdisciplinary context". In this definition not only the increase in students' learning but the significance of making technology a part of the whole process have also been emphasized. Technology integration is not solely concerned about using technology; it is rather a term connected with the content and effective teaching practices (Tondeur, Kershaw, Vanderlinde & Braak, 2013).

In their perceptive control theory Zhao & Cziko (2001) have defined the mandated preconditions for technology integration. Although these preconditions have been accepted as instructions, they still fail to accurately inform the practitioners on the ways how the necessary information and skills would be executed in integrating technology. Similarly, Technology Integration Planning Model developed by Roblyer (2006) has defined the planning stages of integration process and has generally presented for the use of teachers the main conditions for integrating technology to teaching. Adaptation and integration approaches, resistance shown towards technology, budget inadequacy, institutional priorities, demography of the students, institutional culture, leadership issue, the process variability followed through adaptation process are viewed as the definers of the process of technology-integrated teaching (Nworie, 2011).

Maddux & Johnson (2006) analyzed integrating technology to teaching with respect to two different approaches a.k.a as Type I and Type II. Type I practices are acknowledged as Using Technology in Teaching Process and Type II practices fall into Integrating Technology to Teaching process. To illustrate, if in climate topic a geography teacher demonstrates via a presentation program the graphics that view annual distribution of precipitation and temperature while teaching climate types, this practice falls into Type I dimension. During this process the teacher is actively engaged whereas students remain as passive listeners. In Type II practices it is attested that teaching process can still take place even in the absence of technology (Maddux & Johnson, 2006). This statement however does not translate to avoiding technology use in teaching environment; quite the contrary this claim equates to the smooth, uninterrupted and routine use of technology in teaching environment thereby leading to being an almost-invisible and natural component of teaching process (EDUTOPIA, 2011). In Type II practices students are equally active as the teacher. In this process students can at times get engaged in solo or cooperative or collaborate with their peers to design and develop authentic course materials. For instance, in a lesson that is on climate topic again, the teacher presents to his/her students climate type graphics by using any given presentation program. Next, the teacher refers his/her students to a website bearing data on temperature and precipitation data of climate types and asks them to retrieve data on the relevant page and tabulate the data on Excel program before plotting the data on a table and asks students to identify to which climate type these graphics pertain to. The practice explained here falls into Type II dimension. Since students are active participants of the teaching process, learning is much more fun and permanent in Type II practices (Perkmen & Tezci, 2011: 4).

A major part of technology integration indicators get to the surface during teaching process. In that sense what bears highest value is not the intensity of teachers' technology use during teaching process but integrating technology to the topic via an applicable pedagogical approach (Mumcu, Haşlaman, Usluel, 2008). Indeed Brush & Saye (2009); Kramarski & Michalsky (2010) in their analyses put forth that teachers considered themselves incompetent in developing a topic-oriented technological content. As argued by Çağıltay et al. (2001) factors affecting teachers' technology integration can be grouped under two titles. These are intrinsic factors that refer to teachers' perceptions, attitudes and conceptions and extrinsic factors that entail their training on technology and existing gaps in knowledge level. It was nevertheless posited in certain studies that (Bulut & Koçoğlu, 2012; Gao, Wong, Choy &Wu, 2010; Harris, Mishra & Koehler, 2009; Tsai & Chai, 2012; Türel & Johnson, 2012) even if teachers were trained on technology integration issue, they were still hesitant to use technology in their teaching processes.

Perception relates to the process of making sense of the surrounding objects and events upon organizing and interpreting available sensory data. Two types of perception can be noted in the genetic process of human beings; objective perception and expression perception (Hoşgör, 2016). In this study, differing from earlier studies in literature, technological components in geography teaching were examined in a holistic perspective and both objective perception and expression perception of geography teachers were explored. Within the scope of executed study researchers recognized all the materials and tools, be it the simplest material (chalk) or the most sophisticated ones (hardware and software tools), as a technological tool in the process of teaching geography. Within this context it was also aimed to manifest the way geography teachers in their teaching processes perceived these technological objects and included relevant objects to their teaching practices in classroom environment.

As is the case in several other studies in relevant literature, using technological objects in the teaching process of geography lesson would indisputably enable a multiple-learning environment; assist to the varied learning methods and learning needs of students (Yeşiltaş, 2009); facilitate recalling process; concretize abstract objects (Yaşar & Gültekin, 2009: 313); save the time spent; allow to observe the objects infeasible to bring to classroom in a safe manner and facilitate comprehension process upon simplifying the context (İşman, 2008). In addition to all the benefits listed respectively it is also agreed that there is a rising demand in relevant literature for analyzing technology integration through a holistic perspective. So much so that in parallel with the increasing number of geography teaching studies into which lately popularized teaching materials or equipment is introduced on a daily basis or in which effects of different variables in teacher and student research groups (Internet usage, Suı & Bednarz 1999; computer usage; Çelik, 2007; Saba, 2009; Şeyihoğlu & Geçit, 2011; GIS usage, Kerski, 2003; Çelik, 2007; Koutsopoulos, 2008; Bednarz &Schee, 2006, Özgen & Çakıcıoğlu, 2009; smart board usage, Ateş, 2010; web usage, Frazıer & Boehm, 2012; digital geography teaching, Scheeet al.; digital maps, Donert, 2015) one of the most critical problems encountered is that using technology and integrating technology are the concepts that have been at times interchangeably or synonymously

used. It is thus the objective of this study to provide a holistic perspective to literature studies conducted and to illustrate the difference between using and integrating technology by unveiling the perceptions and practices of teachers.

Research Model

This is a qualitative-pattern study that utilized interview method. Interview is a communication process that is orally executed between two parties minimum. Interview can also be defined as collecting data from relevant parties within the framework of investigated questions in the research (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2008: 232). Gathering profound information constitutes the basic tenet of the interview technique utilized in qualitative studies so as to construe the semantic world of interviewed parties; to obtain comprehensive data to grasp their emotions and ideas and to demonstrate their perspective on the topic (Kuş, 2007:87).

In any qualitative study taking detailed field records, providing accurate and comprehensive information by the research team, examining of the field notes by the participants to ensure accuracy, registering audio and visual records, directly quoting from the participants and presenting the quotations with no additions enhance the reliability of the study (Büyüköztürk et al., 2008). In this study likewise interviews with teachers were (approximately 35-50 minutes) audio recorded to the end of strengthening the reliability of interviews. Once the audio records were transferred into script format participants were asked to reread the texts and the accuracy and correctness of records were thus confirmed. Further to that the statements of participants were presented without any additions in the findings part of this study.

In any qualitative study internal validity relies heavily on the parallelism between the categories and interpretation set by researchers and the actualized findings as well as the degree of mirroring the reality. On that account findings designated by researchers were evaluated with respect to their authentic environment and relevant literature. Next it was analyzed whether they were internally consistent and significant. To ensure external validity the features designated by Miles & Hubermman (1994) (Quot.: Yıldırım and Şimşek, 2008) are taken into account in any qualitative study. Accordingly research group of the study was delineated in depth to allow a comparison with other research groups and the sampling was assorted to enable a generalization process. To illustrate, considering the total quantity of geography teachers (28) in middle schools within Nevşehir (Turkey) city center, voluntary participation of the (22) students employed in different school types allowed the execution of process excluding the teachers unwilling to participate in the study (6).

Research Group

Research group of this study consisted of a total of 22 (14 Males; 8 Females) Geography Teachers volunteering to participate in the study. Teachers were selected from 5 different types of schools within Nevşehir (Turkey) city center during 2015-2016 Academic year. It was detected that 3 teachers in research group had experience in a range of 0–5 years; 8 teachers had experiencein a range of 6-10 years ; 7 teachers had experiencein a range of 11-20 years; 4 teachers had 21-year and higher experience.

17 teachers were graduates of Faculty of Education, 3 teachers were graduates of the Faculty of Arts and Science and 2 teachers had Associate Degree diplomas. During their undergraduate education 12 participants received the course titled as Developing/Designing Teaching Technologies and Materials. 4 participants attended an in-service training seminar on the application of teaching technologies and materials.

Data Collection and Data Analysis

Research data were collected by the first author of the research having employed semi-structured interview form consisting of two parts. The researcher visited participants' schools in the prescheduled hour and data were collected during the interview processes. In the first part of the interview form, multiple-choice questions were included to detect professional features of the interviewed teacher. In the second part open-ended questions were asked to unveil teachers' perceptions of integrating technology to teaching and their practices. The interviews were recorded upon receiving the consent of participants. Next audio records were transferred into scripts and qualitatively analyzed. While presenting the findings obtained after the analyses, direct quotations from the responses of the participants were rendered. In coding the participants names, ''M1, M2…'' for male teachers and ''F1, F2…'' for female teachers were applied.

Findings

In this part of the study, findings obtained by analyzing the data gathered from the interviews with the teachers are presented.

1. Geography teachers participated in the research were addressed "how competent do you feel about using teaching technologies and materials in your classes?" question in order to determine how competent they feel about using teaching technologies and materials in their classes. 4 of the teachers expressed as competent, 10 of them answered as partly competent and 8 of them answered as incompetent. M4, one of the teachers answering I feel competent, said "I've been using computer for a long time. I started using computer in 1989, so I don't have technology related problem now." M6 said "I feel competent because as I have worked as a formatter for four years, I have prepared many presentations and videos in order to have the students visualize and concretize all subjects. That's why, I feel myself very sufficient while I am using technology in my classroom".

M10, one of the teachers answering I feel partly competent explained "I took this course during my post graduate but the course was mainly focusing on public personnel selection examinations we didn't study in detail. So I feel incompetent about Geography Information System but I am competent in using not only computer but also overhead projector, smart board and photography. But I'm not competent in measuring devices like barometers"; F1 said "We cannot use new technologies since we haven't undergone a training about it or it just may be because of us. I now try to keep up with the technology"; F6 said "I haven't been able to improve myself in this field since we hadn't had projector or smart board till this year. I try to use these as much as possible now. Not having a geography lab and enough material are reasons".

About the reasons for feeling incompetent, M1; one of the teachers answering I don't feel competent said "I don't feel competent since we don't use them much. The school's expectations are important. Here in science high school, students' expectations are for teaching the subject and preparing a subject related test for them. The curriculum of the 9th grade is heavy. So we don't have time to develop materials but we use the employed technologies. We try to use thesmart board as much as we can"; M2 said "I don't feel competent enough as I only have undergonetrainingabout smart boards provided by the Ministry of National Education (MNE)"; M12 said "We aren't competent because the technology is constantly changing. We can use the smart board by using the readymade or downloaded slides but I'm not competent in preparing a slide myself".

In the light of these statements, it can reasonably be argued that teachers having the ability of using computer and preparing a visual presentation feel further competent in preparing instructional technologies and using materials in the lesson whilst the ones lacking this ability consider themselves partly competent or incompetent.

On the other hand, teachers attribute the reasons for considering themselves incompetent to their undergraduate education in which they were not provided with sufficient level of education on instructional technologies and material development; varied expectations of students with respect to the school type they teach in; lack of an in-service training on instructional technologies & material development and the inadequacy of the technologies and materials at schools.

One surprising finding of this analysis is the few number of teachers that attributed this incompetency to their own failure (F1, M3). Besides, teachers who considered themselves competent, attributed this perception to being able to use computer alone, which indeed evidences that teachers possess limited knowledge on using technology and materials. In terms of material usage the only asset that comes to teachers' minds is using a computer. However, Cuban, Kirkpatrick & Peck (2001) stated that according to the studies, having computers at schools doesn't mean that technology is used by the educators as expected or that students could correctly perceive this technology.

2. The teachers having participated in the research were asked which instructional technology and materials they used and for what purposes. In the given answers, teachers stated that they use smart board, map and sphere respectively. Teachers said that they use smart board in order to better visualize the geography topic (M8: "understanding especially visual topics or presentations better in terms of geography"), get information in a short time (M12: "to reach geography-related information in a short time") and teach the topics better (M14: "learning visual topics and presentations properly in terms of geography"). This finding corresponds exactly with that of Jang (2010) and Ateş (2010).

All of the participating teachers stated that they use map in their courses. Maps are placed on the top in geography teachers' material use list as was the case in the study conducted by Sönmez, Çavuş & Merey (2009). In this study conducted, one of the teachers particularly emphasized that he uses digital maps instead of published ones (M4 "There are maps but I don't need them. Digital media is more sufficient for me. I use digital maps."). Map is indisputably a significant material of the geography lesson.

It is important that all of the teachers said that they use them in their lessons. Use of the digital maps is also an important finding. It is possible to access various maps by digital media. These maps enable to enrich the learning environment and provide ease of use of smart boards and projectors. This finding obtained in the research also corresponds with those of Ateş, 2010; Lai, 2010; Aksoy& Ünlü, 2012; Donert, 2015.

Sphere is used by all of the participating teachers in their lessons. Sphere has been one of the must materials of the geography lessons for a long time (Demirci, Taş & Özel, 2007). However, taking into consideration that except for maps and spheres, the materials that can be used in geography teaching are visual and audio, materials such as models, tables and graphics, photos, magazines, CD and cassettes, TV programmes, slides and music, measuring devices, periodicals, encyclopedias, art works, natural resources and various models must all be provided. The schools in which the interviewed teachers worked can be labeled as insufficient in material provision. In fact, Sönmez, et. al., (2009) and Demirci, et. al., (2007) determined that most schools are insufficient in terms of technology and materials. It was also detected that in 17 teachers' schools there were computer labs but no computer lab was available in 5 teachers' schools. Besides, 14 geography teachers stated to never using the lab and 3 of them stated to rarely using the lab.

In the interviews, teachers said that they use the computers at their schools for preparing written exam and presentation, reading e-mails and news. These findings correspond with Gür, Özoğlu & Başer's (2010) study. Moreover, as regards the reasons for not using the computer labs since they already had one in their schools, teachers explained that they felt no need to use the lab since there are smart boards at schools (M6 : We have a computer lab but I haven't used it before. Why haven't I? Because as I said I feel like I don't need to, since the smart board is sufficient; M8: I don't think we need a computer room or something else since there is smart board; M1: There isn't a computer lab and I don't think a computer lab is needed since there is smart board; M7: Well, we don't need a practice like that if we have internet).

It is also stated in the Ministry of National Education guideline on the sufficiency of teachers (2011) that teachers need to be technology literate, benefit from computer and other technologies, use applications like on-line magazines, packaged software and e-mails. But as is understood from the statements of the teachers, they use computer software more in Type 1 dimension in geography teaching.

Interviewed teachers stated that except for the materials provided by the school, the materials they prepare or provide are PowerPoint presentations (15), models (5), and books on YGS – transition to higher education examination (1), special lecture notes (1), collections (3) and magazines (1). Also in the study conducted by Çelikkaya (2013) on social science sampling power point presentations are placed on the top among the materials prepared by the teachers' themselves. In the research conducted, it is also remarkable that teachers provide the materials from internet environment rather than preparing authentic ones (M1 "I prepared the presentations myself, in fact we did it together but I haven't updated them. There aren't any other materials"). In his study titled geography teachers' internet usage for instructional purposes, Sezer, Yıldırım

&Pınar (2010) stated that teachers use the internet mostly for providing documents (annual plans, power point presentation, exam questions etc.). Moreover, according to Erkan, Akkoyunlu & Tuğrul (2010) and Dursun & Çevik (2005), teachers use the internet for informative purposes.

Six teachers prepared models in geography lesson (M2: Preparing rainfall set up and rock groups; M14: They weren't very successful but I once got them to prepare soil profiles. F8: For example we teach resources to the children. What is a resource and what does it look like? What do we get the children to do in order to observe it? For example, how can we make an impermeable layer? First we lay down a plastic bag or nylon. I got glass cut from an aquarium. I put foams inside and carved to show caves. I showed sink hole, polje. I tried to show stalactites and stalagmites; M9: we made a volcano model; F7: Horst-graben, illumination, map of a mine, map of agricultural products, model of anticline and syncline; F3: I prepared a local hour mechanism, shadow length setting), three teachers got students to prepare collections (F7: I try to gather rock or plant collections for students; F2 : I gave rocks and plants as assignments to the students. They bring plants as it is hard to bring rocks. M9: I have a rock collection I use in the first unit of the 10th grade.; F4 : I got relief map made. Children learned elevation benchmarks better. M8: I made a relief map at my school. I sometimes use it maps subject), one teacher had students subscribe to a magazine (F1: Students subscribed to magazine thanks to me), one teacher prepared lecture notes and handed out to the students (F2: I prepare lecture notes as a summary of the unites twice a year especially towards the end of the year), one teacher provided books on YGS – transition to higher education examination (F4: I teach rather with books on ygs focus on the exam. In 11th and 12th grades at most we focus more on YGS in our curriculum. First I teach the subject and then we do tests. I teach the subject again via the tests. I sometimes give my own books and materials to the students.). Apart from that, it was found that 7 teachers did not provide or develop any materials other than the technologies and materials the school provided.

Upon analyzing the answers provided by interviewed geography teachers it is feasible to allocate the aims of using instructional technology and materials into ten different categories.

Visualizing and concretizing the subject. M6: We use instructional technologies and materials to enable students to learn better by addressing more sense organs. As a teacher with 13-14 year experience, I really observe the benefits. Children aren't unaware of the things you teach. These become more permanent when you concretize them in order to show them that some of these things are the ones they see andexperience in life. They both learn the subject better and forget later than usual. M2: We try to teach the subject better by using slides in a way for them to understand it visually without living or seeing it in real life. Smart boards sometimes break down during the lesson. Then students say that it is different when they learn it visually and learn without visual materials. So it is necessary to visualizethe subject as much as possible. F6: We try to teach the Earth, vegetation covers, geographical formations in the world and related subject in geography lesson. Since it isn't possible to see them in

classroom environment, I enable them to see by showing the photos via smart board. Thus, I try to prevent the subject from remaining in theory.

Addressing different sense organs. M13: I use it in order to address different sense organs, awaken children's interests to the subject and convince children when teaching concrete subjects.

Learning by practicing-experience. M9: Technology should be used and as we know it is short-lived. We cannot preserve something by hiding it from children. They somehow do, touch, learn and break. They can only learn like this.

Teaching the subject better. F2: Since it's a visual lesson, technology is important for them to perceive better, repeat the subject. I think they learn better if they do something themselves, I think it is time-saving.; M3: In order to learn the subject better, students prepare animations and slides themselves for example about the rivers in Turkey; M11: Our purpose of use is of course for teaching better and being happy. You receive feedbacks when you teach by using the technology and this makes you happy.

A more enjoyable and fun lesson. M9: When the students understand that a material is going to be used they are more interested. When they look at an object their attention is gathered and this is very important for learning. Using materials make learning more permanent. F1: As I have mentioned before, we use it because not only the teacher but also the students have more fun. Teaching happens in a better way and we reach our aim better. M5: It is my aim to provide for my students a fun classroom setting where they can actively get engaged, sense the objects, practice and establish connection between the classroom setting and the example on climate. In this performance I aimed to render information about earth's rotation and its abort-to-orbit. I also aimed to ease their learning through experiencing and having fun during this process. Furthermore program functions take place in a quick speed.

Associating the geography subject with daily life. M4: I think students need to associate geography with his/her daily life. For example, now the weather is cloudy. Does this mean anything to you? What I am trying to say is they need to correlate daily life with the theoretical knowledge. In this frame I want to be effective, I mean, there is no use to take the students to geological museum or a botanic park and say, look kids this is this rock and this is this plant. The important thing is they need to find out what this theoretical knowledge means in real life. F3: While teaching climate, vegetation, rocks, students do not learn them but when the students see the materials, they learn permanently. For example, after you teach the relative humidity he says that we are in the low pressure system area or in high pressure area. When students see the earth stratum he/she understands that fact that geography is the life itself, geography is his habitat.

Providing permanent learning. F4: for me, providing more permanent learning means to increase the visuals in geography class. M8: Teaching the course visually to make it permanent. M10: Our goal is to teach geography subjects goals effectively and help the students enjoy geography, recognize the nature, in which he lives, knows what to do when he is alone in the nature and provide permanent learning.

To save time. M14: Saving time means the more material teacher uses, the more students enjoy geography lesson. F6: While answering a test question in classroom, I use the smart board for all the students to be able to see the questions clearly. Using the smart board for solving the test questions saves more timecompared to handwriting.

Enrichment of the lesson for different types of intelligence. M1: as every child has different intelligence types, their requests for using technology and materials are different, too. So we need to diversify the lessons as the students do not want verbal lecture.

According to this study the findings listed hereinabove are consistent with research findings carried out in different domains to investigate the objectives of geography teachers in using technology and materials. In some of these studies evidencing a significant relationship, it is stated that when technology is integrated to geography teaching, it is foreseen that the use of technology will provide a multiple-learning environment, thereby assisting the students with different learning skills (Yeşiltaş, 2009); facilitate recalling process by materializing the abstract subjects, save time, allow to observe things safely in the classroom that normally cannot be brought into the classroom and by simplifying the context, facilitating the comprehension (Yaşar & Gültekin, 2009: 313).

Here the contradictory statement is that although geography teachers said they use the technology and material in order to save time, they also expressed they cannot use technology and materials in technology-integrated practices due to lack of time (M11, Teacher spend too much time when you give one or two minutes for each student for the applications on the smart board such as finding a place on the map although the student understand better in this way. F2, Because of time limitation of our courses we do not develop materials with students, it is a waste of time, I usually assign my students with homework such as preparing a collection or preparing the soil section, they prepare these materials at home and then we use them in the classroom.)

3. The question, "what kind of practices they implement by technology and materials in their classroom?" has been asked to Geography teachers interviewed. When the obtained data are analyzed, the practices implemented by the teachers using educational technologies and materials in their course can be collected under five titles. These are:

Map usage. F2, I study on the maps and parallels and meridians on the sphere with my students; M10, There are maps on the school walls and we use the maps with our students practically.

Preparing figures and graphics. M14, For example, visualizing the photographs and videos taken in the field, shapes and graphics we draw on the computer in order to use them in the class. Satellite images can also be used.

Preparing visual presentation. M3, Geography course covers all topics that are related to human beings, I mean, the topics which affect people are subjects of geography. So, all of these topics need to be visualized via technology and it need to be eased so thattheycan be understood by the students. For example, the fairy chimneys can be taught visually, theoretically or going to the fairy chimneys area and tell the

topic, the students understand and keep in mind the topic much better M6, It is very cliché that, nature is the laboratory of Geography but we do not have the chance to go to the nature as we are time and curriculum bounded. In this sense, video and various flash applications on smart board or PowerPoint presentations can be used for integration for the topics that students cannot go or see clearly. For example, while teaching rocks I ask "Do you know volcano rocks glass? He/ she answers "no "When I showed he says that it is the Qingstone. In fact lots of the things are things that he/she has seen before but it sounds different as a word. I think we can integrate this way, so if we cannot go to the nature, we can bring nature to the classroom.

Designing model. M2, Preparing precipitation mechanisms, creating a rock group. One of my students prepared a material that was called as term homework before, about the formation of the continents. What he prepared from paperboard surprised me a lot, I saved the material for a long time but I gave it back to my students as there is not a suitable place to save these materials in our school. M14, they were not successful but once I have my students prepared visual material such as; land sections, the karstic springs, sedimentary layers in glass lantern that I helped outside school. We have to be material selective for the course because of the time limitation.F8, while teaching the springs to the students we say fay source, karst source, or slope source. It means only springs to the students. What does springs look like? How the water comes out? In order to answer these questions we need to create a model of springs. M9, we created a volcano model, by throwing red paint, soda, vinegar in it we showed its eruption. Although the classroom was dirty and messy, the students understand better when they see it. F7, Horst-graben, lighting mining map, map of agricultural products, anticline-syncline model, contour line model. F3, I prepared local time mechanism, shadow size mechanism...,).

Smart board applications. M4, forgeography lessons lecturing by hanging the map on the wall period is over so I show sphereand mapselectronicallyin order to lecture the topics. M12, for example, I use smart board while teaching coastal types of external forces, so that students can understandcoastal types of his country by drawing, real images. M13, We can show the formation of rain, but we can only show on the screen in geography, or we tell on the board. There's something wrong; the profile of children are active in class, but there is no material in the school. I think there should be a department for materials in geography in General Directorate of Secondary Education of Ministry of Education, but there are some limited materials in the Education Informatics Network (EBA) M1, I use the smart board with my students but not asactive as we should. It is because of the time limitation. For example, last week, I wanted my tenth grade students to find populous places in Turkey on the contour maps; it caused spending too much time. It is good for effective teaching I have to complete the curriculum because of my school's type. The general education system wants it. M8, I cannot use the smart board for every topic but there is a program called starboard we sometimes work with program on the smart board; M13, We use smart boards for animation, making some of the things visual. Instead of bringing the maps to the classroom we use smart board. We offer the students visual material from geography. M16, I have some materials that I found from geography sites of the Education

Informatics Network (EBA), and I use them for teaching geography via smart board. For example, while teaching the plant communities topic in the tenth grade I show pictures of the plants. In my opinion, without this normal world's shape and movements topic is not understood completely, for example; when you draw axial tilt on the board you draw it straight. Therefore, it does not work. Teaching 21 March-23 September topic is very easy via smart board. Also your drawing capability does not have to be very good in a smart board.

As the interviews revealed, the majority of teachers considered smart boards as the main source of practices they conducted within the context of technology integration. As understood from teachers' explanations, teachers use the smart board at Type I dimension to transfer knowledge and visualize issues. According to the study by Korkmaz &Çakıl (2013) about challenges teachers faced in using smart boards, teachers did practices at Type I dimension for using smart boards. Although one of the teachers, M10, said "For example, visualizing the photographs and videos taken in the field, shapes and graphics we draw on the computer in order to use them in the class". Satellite images can also be used as Type II, this practice is noteworthy as it is single and its being the only one is indeed intriguing. On the other hand, Erduran & Tataroğlu (2009) claimed that although teachers use smart board to increase students' interests, it is seen that students do not use the smart board on their own during the class. According to the implemented practices, except creating visual support, preparing model practice differs from the rest of practices. In these types of practices if models and materials are not prepared only by the teacher but rather prepared by the cooperation of both teacher and student, such practices can be assessed in learning by doing process.

4. "The question, what is the integration of technology in teaching in general terms or in geography lesson specifically?" has been asked to Geography teachers interviewed. As responses of teachers are analyzed, it is understood that the general level of knowledge about technology integration to teaching is low. As follows, teachers said that (M1, Integration is transferring technology to teaching. So transferring technology and using it in the class as in geography lesson in which visual elements can be used a lot. A lot of materials can be used via smart board. Simulation like visuals, animations in three dimension...; M11, I know that smart board was not used too much before the IOITA (Increasing Opportunities and Improving Technology Act) Project. Nowadays teachers, started to use smart boards in lessons through IOITA Project.F4, Using technological tools and technological advances in teaching... As I told before geography is related to rituality, so even the easiest topic should be taught by visualizing to the student.For example I told pressure subject three times for the university entrance exam, they still did not understand. For that reason teachers should use technology in geography teaching. F8, The technological tools, and devices should be used in geography teaching and if the smart board is used more actively, it means that technology is integrated.) Teachers define technology integration as using technological advancements in teaching, transferring technology to teaching and using smart board to support visuality in their classes. This dimension that is defined as Type I is supported by teachers' answers to previous questions since teachers stated that they used visual materials during transferring information.

However, the practices carried out by teachers within the scope of technology integration to teaching in their courses can be defined as Type II dimension;for example (M2, technology that students use in daily life should be integrated in teaching. It is very possible to use technology in our classes; visuals can be used more than the other classes. Animations can be used for students, videos can be prepared, and simple mechanisms can be made. For example, photos can be taken by mobile phone and projected while teaching scale topic. Grand and microscale can be learnt well and permanently. An experiment can be done with a simple water bowl while teaching relative humidity topic.) and teachers' practices, that their students make models (M2, Preparing precipitation mechanisms, creating a rock group.M14 ,preparing land sections, F8, Springs model.; M9, A volcano model ,.... F7, Horst-graben, lighting mining map, map of agricultural products, anticline-syncline model, contour line model ...; F3, local time mechanism, shadow size mechanism).

However, although some of the studies conducted abroad (Tondeur, Cooper, & Newhouse, 2010; Koehler, Mishra & Cain, 2013; Kafyulilo, Fisser, Pieters &Voogt, 2015) highlighted that teachers integrated technology in teaching at Type II dimension in their classrooms, when other conducted studies and the body of literature is examined it is understood that teachers cannot accurately integrate technology to teaching (Bingimlas, 2009; Choy, Wong, & Gao, 2009; Şimşek, 2008; Ulusoy & Gülüm, 2009).

Conclusion

When the research findings are evaluated it can be concluded that the perception of the interviewed geography teachers' towards technology integration to teaching is in Type I dimension. In other words the findings evidence that not the integration of technology to geography teaching but using technology in geography teaching is more popular. The evidences supporting this conclusion are as follows.

• The high level of competency among participating geography teachers in using computer programs or preparing presentations during geography teaching process is perceived by teachers themselves as their higher competency in using teaching technologies and materials.

• In their lessons participating geography teachers utilized smart board, maps and geographical sphere as visual aids during knowledge transfer.

• Although a vast majority of geography teachers perceived smart-board use as integrating technology to teaching, in lieu of integrating smart board to teaching in their classes, they utilized it as a visual presentation and aid for knowledge transfer.

• In the practices teachers conducted during geography teaching processes, teachers alone were active participants whilst students remained passive.

• Except performance or project works such as model and replica preparation or map-based operations assigned by the teacher, no finding was detected to evidence that students by themselves applied teaching technologies into their practices.

In this age technology is regarded as an integral part of teaching. However, its function depends on the teachers using it in class.It is for certain that using visual media

is important in order to establish multimedia in the teaching-learning process. Using visual elements by the geography teachers in this study is a noticeable finding. However more effective learning environments are the environments in which learning takes place through experiencing.In order to achieve this, it is not enough to use only visuals in the classroom. Current learning approach should focus on students' access to new data by using basic information related to the student's field and producing new information on the basis of their knowledge. Advancements in science and technology have immensely accelerated knowledge production. At the same time it is now very easy to get information. Therefore students should be taught how to access information, create new knowledge and be educated on the ways of producing knowledge instead of transferring information. In order to do this, the integration of technology to teaching should be at Type II dimension. In other words, students should be given the opportunity to use the technology themselves in and outside of the classroom activities.

Teachers' perceptions, attitude, skills and infrastructure facilities in the school environment must be adapted for the integration of technology in Geography teaching in Type II dimension. In this context, the following suggestions have been rendered according to the interview findings:

• To popularize integrating technology to teaching, seminars and courses should be organized during in-service trainings to demonstrate concrete examples to teachers; school administration should adopt a supportive attitude during this process and sufficient resources should be provided to teachers for the purpose of integrating technology to schools.
• During the integration of technology in teaching, seminar and courses for teachers, that contains concrete examples in-service training should be organized and necessary resources for the integration of educational technology in schools should be provided to the teachers.

To ensure the integration of technology to teaching, during their undergraduate education, prospective geography teachers should be encouraged to produce technology- aided materials that could be utilized in teaching geography. In that sense it is a must to furnish the geography and computer laboratories of teacher training institutes both qualitatively and quantitatively with required supplies.

References

Aksoy, H. *&*Ünlü, M. (2012). "The Effects of Map Skills Practices in Geography Course toward Students' Attitudes"*Marmara Geography Journal, 26, 16*-41.

Alkan, C. (1997). *Educational Technology* (5th ed.). Ankara, Anı Press.

Ateş, M. (2010). Usage of Interactive Board on Geography Lesson at High School, *Marmara Geography Journal*, *22*, 409-427.

Bingimlas, K, A. (2009). Barriers to the Successful Integration of ICT in Teaching and Learning Environments: A Review of the Literature. Eurasia Journal of Mathematics, *Science & Technology Teaching 5, (3)*, 235-245.

Brush, T., & Saye, J. W. (2009). Strategies for preparing preservice social studies teachers to integrate technology effectively: Models and practices. *Contemporary Issues in Technology & Teacher Teaching*, *9* (1), 46-59.

Bulut, İ. & Koçoğlu, E. (2012). Social Science Teachers' Opinions on the Usage of Interactive Whiteboards (Diyarbakır city example). Dicle University, *Ziya Gokalp Teaching Faculty Journal*, *19,* 242-258.

Büyüköztürk, Ş., Çakmak, E.K., Akgün, Ö.E., Karadeniz, Ş. & Demirel, F. (Eds.) (2008). *Scientific Research Methods*, Ankara, Pegem Academy Press.

Çağıltay, K, Çakıroğlu, J., Çağıltay N. & Çakıroğlu E. (2001). Teachers' Opinions on the Utilization of Computers in Teaching, *Hacettepe Journal of Teaching*, *21* (1), 19-28.

Çelik, E. (2007). *Effects of using computer aided animation on student achievement in secondary school geography lesson.* M.Ed thesis. Marmara University, İstanbul.

Çelikkaya, T. (2013). Social Science Teachers' Using the Teaching Aids and Materials Levels, Ondokuz Mayıs University, *Teaching Faculty Journal*, *32* (1), 73-105.

Choy, D., Wong, A. F. L. & Gao, P. (2009). Student teachers'intentions and actions on integrating technology into their classrooms during student teaching: A Singapore study. *Journal of Research on Technology in Teaching*, *42* (2), 175-195.

Çilenti, K. (1995). *Educational Technology and its Gravity*, Ankara, Kadıoğlu Press.

Çoklar, A. N., Kılıçer, K., & Odabaşı, H. F. (2007). A Critical View of the Use of Technology in Teaching: *Teknopedagoji. The proceedings of 7th International Technology Conference*, 3-5 May, Near East University, North Cyprus.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, *38* (4), 813–834.

Demirci, A., Taş, H. İ. & Özel, A. (2007). Technology Usage in geography Classes in High Schools in Turkey, *Marmara Geography Journal, (15),* 37-54.

Demircioğlu, H. İ. (2014). Instructional Technologies and Designing Material in History Teaching, In H. İ, Demircioğlu - Turan, İ, (Eds.), *Instructional Technologies and Designing Material in History Teaching,* (1-12) Ankara, Pegem Academy Press.

Donert, K. (2015). Digital Earth - Digital World: Geospatial Technologies and Geography Teaching in a Changing World, Solari, M. O., Demirci, A., and Schee D. V. J., (Eds.), *Strategies for Geospatial Technologies in 21st Education* (pp.195-204).

Dursun, F. & Çevik, V. (2005). Teachers' Computer Utilization Level, *XIV. National Educational Sciences Congress,* 28-30 September, Pamukkale, Turkey.

EDUTOPIA. (2011). What Is Technology Integration? Retrieved from, http://www.edutopia.org/teaching-module-technology-integration-whatwebsite .

Erduran, A. & Tataroğlu, B. (2009). Comparison of Science and Mathematics Teachers' Views Regarding Use of Smart Board in Teaching. *9th International Educational Technology Conference, 6-8 May,* Ankara, Turkey.

Erkan, S., Akkoyunlu, B., & Tuğrul, B. (2010). Internet Usage Purposes of Teachers and Digital Competency Levels, *10th International Educational Technology Conference, 26-28 April,* Istanbul, Turkey.

Gao, P., Wong, A. F. L., & Choy, D. & Wu, J. (2010). Developing leadership potential for technology integration: Perspectives of three beginning teachers, *Australasian Journal of Educational Technology, 26* (5), 643-658.

Gür, B. S., Özoğlu, M., & Başer, T. (2010). Computer Technology Use in Schools and Problems Witnessed, *9th National Symposium on Classroom Teaching, 20-22 May,* Elazığ, Turkey.

Harris, J., Mishra, P., & Koehler, M. (2009). Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Teaching*, *41* (4), 393-416.

Hoşgör, K. (2016). On the Problem of Perception, *Kilikya Philosophy Periodicals, 1,* 11-29.

İşman. A. (2008). *Instructional Technologies and Designing Material.* Ankara: Pegem Press.

ISTE. (2005). *All children must be ready for a different world.* Retrieved from, http://cnets.iste.org/intro.html .

Jang, S. J. (2010). Integrating the Interactive Whiteboard and Peer Coaching to Develop the TPACK of Secondary Science Teachers. *Computers & Teaching, 55,* 1744–1751.

Kafyulilo, A., Fisser, P., Pieters, J. & Voogt, J. (2015). ICT Use in Science and Mathematics Teacher Teaching in Tanzania: Developing Technological Pedagogical Content Knowledge. *Australasian Journal of Educational Technology*, *31* (4), 381-399.

Kerski, J, J. (2003). The Implementation and Effectiveness of Geographic Information Systems Technology and Methods in Secondary Teaching, *Journal of Geography 102,* 128-137. Retrieved from, http://www.josephkerski.com/kerski_ jog_implementation_effectiveness.pdf.

Koehler, J. M, Mishra, P. & Cain, W. (2013).What is technological pedagogical content (TPACK), *Journal of Teaching, 193* (3), 13-19.

Koehler, M. J., & Mishra, P. (2005). Teachers Learning Technology by Design. *Journal of Computing in Teacher Teaching*, *21* (3), 94–102.

Korkmaz, Ö. & Çakıl, İ. (2013). Teachers' difficulties about using smart boards, Procedia - *Social and Behavioral Sciences*, *83*, 595- 599.

Koutsopoulos, C. K. (2008). Teaching Geography: Instructing with GIS and about GIS. In Donert, K. (Ed.), *GIS in Teaching,* (25-37). San Diego CA: ESRI Press.

Kramarski, B., & Michalsky, T. (2010). Preparing Preservice Teachers for Self-Regulated Learning in the Context of Technological Pedagogical Content Knowledge. *Learning and Instruction*, *20* (5), 434-447.

Kuş, E. (2007). *Quantitative-Qualitative Research Techniques.* (2. Edition), Ankara: Anı Press.

Lai, Horng-Ji, (2010), Secondary School Teachers' Perceptions of Interactive Whiteboard Training Workshops: A Case Study from Taiwan. *Australasian Journal of Educational Technology*, *26* (4), 511-522.

Maddux, C. D., & Johnson, D.L. (Eds.) (2006). *Type II Uses of Technology in Teaching: Projects, Case Studies, and Software Applications*. New York: Haworth Press.

Matheison, B. (2011). Learning v. Understanding: The Difference between Technology Use and Technology Integration in the Elementary Classroom. Retrieved from, http://sites.google.com/site/brittanymatheison/lessonplans.

Mumcu, F. K., Haşlaman, T., & Usluel, Y. K. (2008). Indicators of Effective Technology Integration in the Framework of Technological Pedagogical Content Knowledge Model. *8th International Educational Technology Conference*, *4-6 October,* Gaziantep, Turkey

Nworie, J. (2011). Adoption of Technologies in Higher Teaching: Trends and Issues. Surry, W. D, Gray, M. R., & Stefurak, R, J. (Eds.), *Technolog Integration in Higher Education: Social and Organizational Aspects* (pp.307-324)

Özgen, N. & Çakıcıoğlu, R. O. (2009) Usage of Geographic Information Systems (GIS) in Geography Teaching and its influence on the Course to Reach the Target Level. *Ahi Evran University Kırşehir Teaching Faculty Journal*, *10* (1), 81-90.

Perkmen, S. & Tezci, E. (2011). *Technology Integration in Teaching: Material Development and Multimedia Design*, Ankara: Pegem Press.

Roblyer, M. D. (2006). *Integrating Educational Technology ınto Teaching. Upper Saddle River*, NJ: Pearson Teaching, Inc.

Seferoğlu, S. (2014). *Instructional Technologies and Designing Material (8ᵗʰ ed.).* Ankara: Pegem Academy Press.

Şeyihoğlu, A. & Geçit, Y. (2011). Investigation of Computer Aided Geography Teaching Studies in Turkey. *Marmara Geography Journal (23),* 327-351.

Sezer, A., Yıldırım, T. & Pınar, A. (2010). Examination of Computer Self-Efficiacy Perceptions of the Students of Geography Teaching. Erzincan *Teaching Faculty Journal*, *12* (2).

Şimşek, N. (2008). Usage of Geography Information Systems in Social Science Classrooms (GIS). *Kastamonu Teaching Journal, 16* (1), 191-198.

Sönmez, Ö. F., Çavus, H. and Merey, Z (2009). The Levels of Geographyteachers' In Instructional Technology and Material Usage. *Social Science Researches Journal. 2,* 213-228.

Tondeur, J., Cooper, M., & Newhouse, C. P. (2010). From ICT Coordination to ICT Integration: A Longitudinal Case Study. *Journal of Computer Assisted Learning*, *26* (4), 296-306.

Tondeur, J., Kershaw, L. H., Vanderlinde, R., & van Braak, J. (2013). Getting Inside the Black Box of Technology Integration in Teaching: Teachers' Stimulated Recall of Classroom Observations. *Australasian Journal of Educational Technology*, *29* (3), 434-449.

Tsai, C., & Chai, C. S. (2012). The ''third''-order Barrier for Technology Integration Instruction: Implications for Teacher Teaching. *Australasian Journal of Educational Technology*, *28* (6), 1057–1060.

Türel, Y. K., & Johnson, T. E. (2012). Teachers' Belief and Use of Interactive Whiteboards for Teaching and Learning. *Educational Technology & Society, 15* (1), 381–394.

Ulusoy, K. & Gülüm, K. (2009). Material Usage of Teacher While Lecturing History and Geography in Social Science Classes. *Ahi Evran University Teaching Science Journal*, 85-99.

Yaşar, Ş., & Gültekin, M. (2009). Usage of Material and Tools for Social Science, Öztürk, C. (Ed.) *Teaching Social Science*, Ankara: Pegem Akademy Press.

Yeşiltaş, E. (2009). Teaching Materials and Technology for Social Science, Safran, M. (Ed.) *Teaching Social Science*, Ankara: Pegem Academy Press.

Yıldırım, A. & Şimşek, H. (2008). *Qualitative Research Models in Social Sciences*. Ankara: Seçkin Publishing House.

Zhao, Y., & Cziko, G. A. (2001). Teacher Adoption of Technology: A Perceptual Control Theory Perspective, *Journal of Technology and Teacher Teaching, 9* (1), 5-30.

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