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Exploring Turkish science education faculties' understanding of educational technology and use

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ABSTRACT

This paper reports the results of a survey that determined science education faculty members' attitude toward computer use. The purpose of this study is to the address the understanding of educational technology faced by science education faculty members in Turkey. Two educational perspective themes concerning the knowledge of science education teachers converge in this study: science education faculty members' current knowledge and desired knowledge of understanding of educational technologies and use. The questions were "What are Turkish science education faculty members' current perceptions on using technological tools in science courses?" and "What do Turkish science education faculty members want to know on using technological tools in science courses?" The findings of this study showed that Turkish science education faculty members are relatively unfamiliar with the advantages of educational technology and do not maximize its use, but they want to know the advantages of educational technology.

Keywords: *technology knowledge; science education; classrooms applications of technology; Turkish education.*

INTRODUCTION

Technology is essential to science for such purposes as access to outer space and other remote locations, sample collection and treatment, measurement, data collection and storage, computation, and communication of information. There are many good examples of using of technology resources to enhance learning in science classrooms. There is no doubt that rapid increase in technological resources is going to have a revolutionary effect on teaching of science (Windelspecht, 2001) and prepare students for life in the real world (Bailey, Ross, & Griffin, 1996; Petrakis, 1996; Stanley, Linauer, & Petrie, 1998). Technology has indeed transformed our lives drastically. Just to give an example, we can now easily communicate with anybody on earth via e-mail. We can also access all kinds of information on the Internet. However, using technology in the science classrooms is not common in Turkish schools yet.

People today think that computer represents the only educational technology available these days, which, of course, is not true since there are many different kinds of technology in the classroom such as the overhead projector, slide and slide shows, documentary video, computer. Briefly, all kinds of tools which teacher are able to use in the classroom to enhance learning are considered technology. With the overhead projector, you can show diagrams, charts, or figures that clearly indicate analysis of the topic, pictures. This device has now become a traditional use of technology in the classroom.

Turkey has made major efforts to integrate educational technology in Turkish education system. The Minister of National education has helped and to controlled effective use of the technology in education institutions of all level and types. The government has sought assistance to introduce a number of projects aimed at improving the quality of education. These projects include up-grading the curricula and instructional materials, revising student achievement test, improving the teacher

training system, and increasing the research component in education (Hizal, 1991; Turkmen & Pedersen, 2005; Yedekcioglu, 1996). Today, many schools are using technology successfully in teaching in Turkey. Although technology integration started after revolutıon of Turkish education system by asisting Dewey in 1920's, electronic technology was not integrated until the introduction of the television in the 1970's. Starting in the mid 1970's, network television broadcast Turkey's first educational television project that was developed at the Eskisehir Academy of Economic and Commercial Sciences. This small project showed that the technology could be used for instruction in an educational setting (McIsaac, Murphy, & Demiray, 1988). But the reason of policits and economics Turkey could not use television efficiently. In 1984, the Ministery of National Education organized 48 training programs, called "Computer Aided Education (CAE)," on technology integration and many teachers were trained in computer literacy and programming with the aim of training more teachers (Yedekcioglu, 1996). In the 1990's, educational uses of the internet in Turkey were in their infancy period. In 1993, Computer Experimental Schools (CES) project has demonstrated that information technology is a powerful tool in the teaching-learning process (Akkoyunlu & Orhan, 2001). In 1998, supporting of the Word bank, the Turkish Government started "Increasing the Quality of Basic Education Basic Education Program". As part of this effort, information technology classrooms were built in at least 2 primary education schools in 80 cities. Following the World Bank agreement in 1998, "Project for Globalization in Education 2000" was important step for the Turkish Educational System. The project was to follow the developments of the "Information Age" and use instructional technology at each level of the education system to enable to Turkish society to use information and technology. In 2004, the K-8 curriculum was completely changed. The goal is to for teachers to be on the cutting edge and provide a student-centered curriculum which will focus both on as well as deeper learning and understanding (Constructivist perspectives). The new curriculum will provide eight common skills that students previously lacked: Critical thinking, problem solving, scientific research, and creative thinking, entrepreneurship, communication, and using information technologies (Turkmen & Pedersen, 2005). Even, the name of the "science education" course was swiched the "science education and technology."

The study was designed to explore Turkish science education faculty members' understanding of educational technology and in light of Turkish science education faculty members' opinions to discuss what Turkish schools need to focus on to integrate educational technology. In the process I will show major themes and results revealed by the data gathered in my survey. Specifically, I am posing the following research question:

1. What are Turkish science education faculty members' current perceptions on using technological tools in science courses?
2. What do Turkish science education faculty members want to know on using technological tools in science courses?

PURPOSE

The purpose of this study is to examine Turkish science education faculty members' attitudes towards the use of technological tools in their science lessons in Turkish colleges of education. The "Faculty Technology Survey: Technology Usage and Needs of Science Educators" examined the differences between current and desired levels of knowledge about using technology as (a) "General knowledge about educational technology," (b) "Ways in which computers can be used to," (c) "How to use a computer in science for," (d) "Effects of computer use on," and (e) "How to use other technology in the classroom."

INSTRUMENTATION

This study was a cross-sectional quantitative questionnaire. The "Technology Usage and Needs of Science Educators" survey was divided into 3 sections; a) Section A has 9 demographic questions; b) Section B, "General knowledge about educational technology," had 14 questions; and c) Section C had of four categories- "Ways in which computers can be used to" with 8 items, "How to use a computer in science for" with 23 items, "Effects of computer use on" with 5 items, and "How to use other technology in the classroom" with 11 items. Each category of section C was answered in two different levels, which are "Current Knowledge" and "Desired Knowledge" (See Figure 1)

This questionnaire was made of two different surveys, "Metiri Group Faculty Technology Survey" (Metiri Group, 2001) for Sections A and B, and Pedersen and Yerrick's survey, "Technology in science teacher education: Survey of current uses and desired knowledge among science educators" for Section C (Pedersen & Yerrick, 2000). The result of analysis showed that the reliability of section B was 0.828, section C was 0.902 (Category C1: 0.807, Category C2: 0.887, Category C3: 0.846, Category C4: 0.866).

The survey used a 5-point Lickert-Scale. A value of 1 represented "does not apply," 2 "strongly disagree," 3 "disagree," 4 "agree," 5 "strongly agree" in section B. For section C, a value of 1 represented very low level of knowledge, while 5 represented a very high level of knowledge, as an "Anonymous/Confidential Survey," no personal information included on the survey.

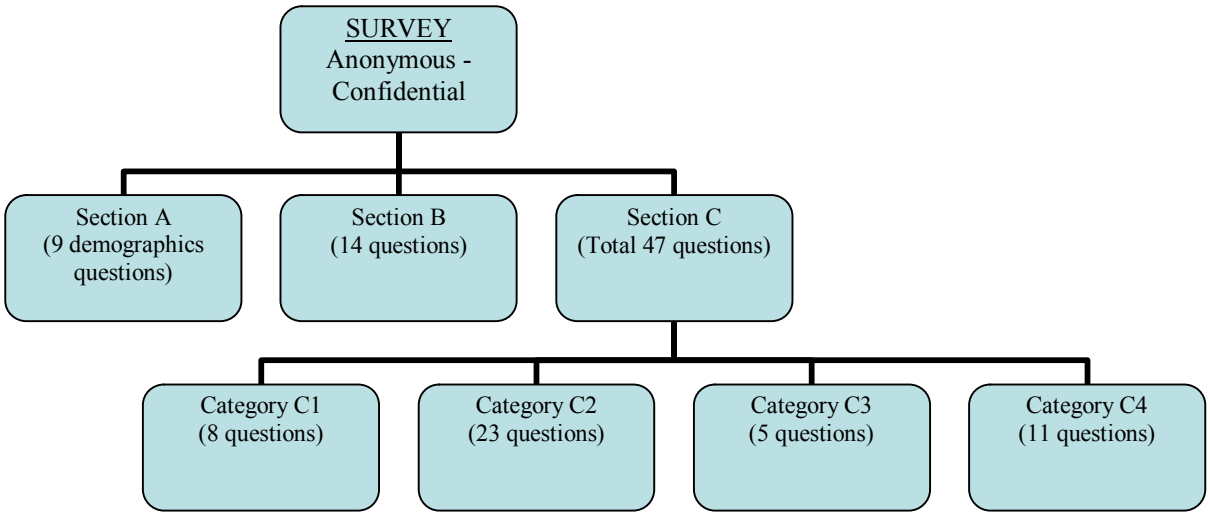

Figure 1: *Instruments of study*

DATA COLLECTION PROCEDURE

There are currently 34 science education departments or programs in colleges of education in Turkish universities. Since I could not reach the entire population; I divided the population into seven segments based on the seven geographic regions in Turkey. Before conducting the research, a letter and e-mail was sent to the colleges of education deans and science education

faculty members for their permission. The letter explained the purpose and importance of this research. I sent one to five letters to universities in each region. However, each region does not have same number of universities. I randomly selected five universities by writing each university's name on a piece of paper, putting those names in a cup, and then drawing five names. Thus, I sent permission letters to a total of 27 Turkish universities.

The data was collected by using two paper-and-pencil questionnaires. Turkish science education faculty members were asked to fill out the questionnaire in their personal time. Participants completed the survey in 20-25 minutes.

DATA ANALYSES AND RESULTS

A total of 62 science education faculty members from 20 different Turkish universities were surveyed face-to-face and online in this study. One-way ANOVA test with selecting 0.05 α were used to determine whether the sample means were statistically different. The magnitude of the mean differences was also examined. The mean differences were categorized as small (<0.00-0.50), medium (0.51-1.16), or large (>1.17) to assist in making sense of the differences between current and desired levels for each item. Overall, 62.9 % of the surveyed faculty members were male, while a smaller number 37.1%, were female (Table 1).

Table 1: *Gender Differences between Turkish Science Education Faculties who participated in the survey.*

	# Male	**% Male**	**# Female**	**% Female**	**# Total**	**% Total**
Turkish Faculty (by e-mail)	10	16.1	1	1.6	11	17.7
Turkish Faculty (by face to face)	29	46.8	22	35.5	51	82.3
Total Faculty	39	62.9	23	37.1	62	100

This study showed that most of the Turkish science education faculty members supposed they are called themselves in intermediate (46.8%) and/or in advanced (46.8%) level technology user (See Table 2). The rank of faculty may play an important role regarding technology usage in preparing science teachers. Although most of the faculty members (Teaching assistant, Instructor, Assistant professor) do not have enough experience as educators, because they are in beginning of their carriers, they have taken technology courses, and have had proficiency in the English language in order to earn their Ph.D. (See Table 3). This provides opportunities to read and understand current research and new approaches that utilize technology for education. It would seem that assistant professors have an advantage over instructors and are able to gain a broader understanding of technology through their program of study and subsequent reading and study.

Table 2: *Skill and Gender for Faculty Counterparts*

Skill	**Male # - %**	**Female # - %**	**Total # - %**
Non-user	-	-	-
Novice	2 – 5.2	-	2 – 3.2
Intermediate	18 – 46.1	11 – 47.8	29 – 46.8
Advanced	18 – 46.1	11 – 47.8	29 – 46.8
Expert	1 – 2.6	1 – 5.4	2 – 3.2
Total	39	23	62

Table 3: *Rank and Gender Differences for Faculty Counterparts*

Male # - %	**Female # - %**	**Total # - %**
7 - 11.3	12 - 19.3	19 - 30.6
9 - 14.5	1 - 1.6	10 - 16.1
19 - 30.7	6 - 9.6	25 - 40.3
2 - 3.2	2 - 3.2	4 - 6.5
2 - 3.2	2 - 3.2	4 - 6.5
39 - 62.9	23 - 36.9	62 - 100

There was obviously clear that most of Turkish science education faculty members had not taken enough technology or computer courses. In light of these data, the sample of Turkish science education faculty members had some sort of technology/computer classes at the undergraduate level and attended technology workshop (Table 4).

Table 4: *Technology or Computer Classes Demographic Data*

Level	High School	Undergraduate courses	Master's courses	Doctoral courses	Within the past 5 years	Workshop
#	9	29	14	10	19	33
%	14.5	46.8	22.6	16.1	30.6	53.3

Section B of the questionnaire is related to general information about educational technology and use of technology in science courses. The total mean of Turkish faculty members with degrees from Turkish universities was 3.885. There are a few responds for questions 1, 10, 11, and 14, in the strongly agree or agree level. These responds were related to basic use of technology, such as word processing, power point, email, and ethical/legal implication of technology. Remaining responds were in disagree or strongly disagree level. Interestingly, 6.2% Turkish faculty members with degrees from Turkish universities selected the "does not apply" option for at least one question.

The results showed that Turkish science education faculty members do not have much educational technology knowledge because their mean scores fell between 3.1 and 3.9 (between disagree and agree levels). Thus, they are relatively unfamiliar with the advantages of educational technology and do not maximize its use.

Table 3: *Means for Section B of Questionnaire for Science Education Faculty*

Means for Section B of Questionnaire for Science Education Faculty	**Mean**
14-As appropriate, I address social, ethical and legal implications of technology use with my students.	4.500
10-I regularly use technology to communicate and collaborate with peers (e.g. email, threaded discussion boards, listserv, and chat).	4.436
11-I regularly use technology to increase my own professional productivity (word processing, spreadsheets, end note, PowerPoint, etc.).	4.258
1-When designing my own lessons, I regularly include educational technologies where appropriate.	4.161
9-I have strategies for assessing student products created using technology.	3.919
5-I regularly use technology to enhance learning in my classroom.	3.903
3-I am comfortable planning for class sessions that involve student use of technology during instruction.	3.903
7-I am comfortable teaching with technology and have adequate classroom management strategies for technology-supported learning.	3.855
2-When selecting educational technologies, I refer to, and base my selections on, current research on their effectiveness.	3.807
8-I use technology to assess and analyze student progress e.g. using spreadsheets, grade books, or handheld computers/PDA's to record and manage assessment data.	3.774
12-I have developed my own electronic portfolio.	3.597
6-I have strategies for using technology to individualize instruction and meet the needs of diverse learners.	3.468
13-I have a personal technology plan that guides my own technology-related professional development.	3.419
4-I have strategies for assessing student learning in technology-rich learning environments.	3.387

The following tables provide the current and desired means, mean differences and significance of the one-way ANOVA test. The average mean score of Turkish science education faculty members' was 3.199 in current knowledge level and 4.244 in desired knowledge level. In Table 4, the responses were ranked in descending order by mean differences scores between current versus desired levels of knowledge. The item with the greatest difference for Category C1, "Ways in which computers can be used to," was in question 8, "teach students at distance" (1.839). The lowest mean difference was in question 5, "entertain oneself (games)" (.420). The mean differences were in minimum (<.51) between current and desired levels for only question 5, "entertain oneself (games)," the differences for other questions were in medium or large level. Using the following as a definition of range: 1.000 to 1.999 is "very low," from 2.000 to 2.999 is "low," from 3.000 to 3.999 "medium," 4.000 to 4.999 "high," and 5.000 "advanced" level, the Turkish science education faculty members' current knowledge was in the "medium" range and their desired knowledge level was in the "high" range.

Table 4: *Mean and Standard Deviation for Category C1.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
8) Teach students at a distance.	2.177	1.06	4.016	1.09	1.839
3) Statistical analysis and research.	3.161	.909	4.532	.620	1.371
6) Deliver individual learning (computer aided learning).	3.177	.950	4.436	.692	1.259
7) Design of instructional materials.	3.419	1.033	4.484	.741	1.065
4) Class management (develop syllabi, track grades).	3.694	.841	4.648	.671	.954
1) Composing/writing papers (Word processing).	3.661	.904	4.597	.613	.936
2) Personal record keeping.	3.887	.851	4.581	.588	.694
5) Entertain oneself (games).	2.419	1,124	2.839	1.240	.420

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

In Category C2, "How to use a computer in science for," the average mean score of Turkish faculty members for "current knowledge" was 2.951 and 4.237 in desired knowledge level.

The item with the greatest difference for Category C2 was in question 13, "Communication tools (e.g., list-servers, chat, discussion boards)," (2.222) and the lowest mean difference was in question 12, "e-mail" (.597). The mean differences were large (>1.17) between current and desired levels for each item.

The important set of questions addressed using technology, computers and the Internet to enhance teaching and learning. Creating websites and learning advanced web programming, such as Web publishing (e.g., Dream Weaver, Page-Mill, Navigator, Web-CT or other similar programs), other multimedia authoring software (e.g., Author-ware, Hyper-studio, Macromedia), and Video editing software (e.g., iMovie, Adobe Premiere), were of lowest interest to Turkish faculty members. The exception was for "web search techniques" (question 20). The responses in Category C2, "How to use a computer in science for," revealed a need to better understand how computers might be used as scientific research tools, such as library search, gathering and storing data, modeling and demonstrating, analyzing and communicating findings.

Table 5: *Mean and Standard Deviation for Category C2.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
13) Communication tools (e.g., list-servers, chat, discussion boards).	2.000	1.07	4.222	.441	2.222
23) Creation and/or use of streaming media.	1.919	1.11	3.742	1.11	1.823
16) Web publishing (e.g., Dream Weaver, Page-Mill, Navigator, Web-CT or similar).	2.258	1.06	3.936	1.05	1.678
21) Technologies specific to your field (e.g., probe-ware in the sciences, geographic information systems in the social sciences, etc.).	2.548	1.16	4.177	.950	1.629
15) Other multimedia authoring software (e.g., Author-ware, Hyper-studio, Macromedia).	2.323	1.10	3.919	.980	1.596
17) Video editing software (e.g. iMovie, Adobe premiere).	2.371	1.04	3.935	1.04	1.564
22) Data analysis software (e.g., SPSS, SAS, other statistics or analysis software).	2.807	1.19	4.274	.908	1.467
11) Databases (e.g., Access, FileMaker).	2.548	1.21	3.984	1.09	1.436
6) Problem solving.	2.919	.874	4.323	.805	1.404
18) Graphic peripherals (e.g., Scanners, digital cameras).	2.855	1.33	4.226	.948	1.371
4) Graphing.	3.129	1.17	4.419	.667	1.290
5) Computer assisted instruction.	3.161	1.10	4.419	.915	1.258
20) Web search techniques.	2.968	1.27	4.226	.999	1.258
8) Analysis of lab data.	3.000	.958	4.210	.926	1.210
3) Demonstrations and modeling	3.048	1.17	4.258	.829	1.210
19) Web browsers - Basic functionality and efficiency (e.g., Netscape, Internet explorer).	3.081	1.16	4.290	.982	1.209
2) Database storage of lab data	3.161	1.10	4.307	.879	1.146
7) Individualized instruction.	3.355	.843	4.484	.695	1.129
10) Spreadsheets (e.g., Excel).	3.194	1.14	4.290	.930	1.096
9) Science-technology-society issues.	3.355	.889	4.387	.662	1.032
14) PowerPoint, Astound.	3.387	1.25	4.419	.897	1.032
1) Library search services (data collection using peripherals).	3.726	1.04	4.597	.613	.871
12) E-mail.	4.000	1.01	4.597	.586	.597

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

The data in Table 6 were based on knowledge about computers' effects on classroom management, presentations and preparing for class all produced large mean differences. The average mean score of Turkish faculty members in current knowledge was 3.458 and the highest mean score for a single question was 3.667 (question 4) and the lowest mean score for a single question was 3.048 (question 1) respectively. Using the previously defined ranges, it is apparent that Turkish faculty members' current knowledge of "effects of computer use on" was in the "medium" range. The average mean was 4.575 in desired knowledge. The item with the greatest difference for Category C3, "Effects of computer use on," was in question 1, "Classroom management" (1.18) and the lowest mean difference was in question 3, "Professional presentations" (.823).

Table 6: *Mean and Standard Deviation for Category C3.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
1) Classroom management.	3.048	.965	4.226	.848	1.18
2) Class preparation.	3.419	1.03	4.387	.732	.968
5) Time management.	3.484	.971	4.419	.821	.935
3) Class presentations.	3.661	.974	4.500	.621	.839
4) Professional presentations.	3.677	1.07	4.500	.763	.823

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

The average mean score of Turkish faculty members was 3.098 in current knowledge level and the highest mean score for a single question was 4.097 (question 5) and the lowest mean score for a single question was 2.129 (question 3) respectively. For "desired knowledge," their mean score was over 4.000 which would indicate that they desire to have a higher level of knowledge about "How to use other technology in the classroom".

The item with the greatest difference for "How to use other technology in the classroom" was in question 4, "Hypermedia" (1.548) and the lowest mean difference was in question 5, "Overhead projector" (.019). The results indicated that overhead projector, calculator, and slides were the most used educational tools in Turkish classrooms. Also all faculty members agreed that hypermedia and interactive video are the least used technological tool. Perhaps, this is because this technological tool is rather new and new technologies, like computer, interactive video, hypermedia, and digital camera are not well integrated into the Turkish educational system. The mean differences were in large (>1.17) and in medium (1.16-.51) between current and desired levels for each item, except questions 5, and 8.

Table 7: *Mean and Standard Deviation for Category C4.*

Questions	C1C		C1D		
	M	SD	M	SD	MD
4) Hypermedia.	2.452	1.17	4.000	.868	1.548
3) Interactive video.	2.129	1.09	3.629	1.15	1.500
2) Film.	2.661	1.16	3.887	.907	1.226
10) Digital cameras.	2.871	1.26	4.097	1.13	1.226
1) Video.	2.903	1.18	4.016	.878	1.113
11) Others.	2.710	.965	3.677	1.11	.967
6) Slides.	3.677	1.17	4.258	.991	.581
9) Microscope.	3.403	1.49	3.968	1.38	.565
7) Concrete Manipulative models (Photographs...).	3.581	1.06	4.097	1.05	.516
8) Calculators.	3.597	1.12	4.097	1.11	.500
5) Overhead projector.	4.497	.882	4.516	.718	.019

M: Mean, SD: Standard Deviation, MD: Mean Differences, C1C: Current knowledge, C1D: Desired Knowledge.

CONCLUSION

A survey of the Turkish faculty was undertaken in an effort to establish both current uses of educational technologies and to determine the gaps between current and desired levels of knowledge. The greater gap, the more valuable it would be to profession to address those technologies. It appears that among science education faculty members there were substantial and specific areas for which technology uses were important. It seems that each questions required professional knowledge.

The results of this study showed that the Turkish faculty members have the low mean scores in current knowledge level of educational technology usage and needs of science education, indicating they may not be prepared with skills necessary to succeed in the 21st century. That means, teacher educators do not sufficiently model appropriate use of computers for instructional purposes, either in courses or field experiences. Indeed, science education faculties tend to focus more on the older and simpler instructional applications of computer technology (e.g., computer assisted instruction, word processing) and older educational technologies (e.g., overhead projectors, calculators, slides) and less on exposure to and practice with newer, more sophisticated tools (e.g., electronic networks, hypermedia, digital cameras, integrated media, problem-solving applications), which support development of students' higher-order thinking and problem-solving skills. The results from this study corroborate Cagiltay, Cakiroglu, Cagiltay, and Cakiroglu, (2001) study which found similar results about Turkish teachers' view of using computers in education.

The results of this study showed that Turkish faculty members, who taught in public or private K-12 schools or universities (Section A, question 3), do not have enough information about how useful educational technology can be and they indicate an inadequacy in their preparation to use computers and other technological tools in their classroom (see Tables 3, 4, 5, 6, and 7). In some cases, Turkish faculty members (educated in Turkey), who taught in public or private K-12 schools or universities, work with Turkish faculty members with degrees from western universities. However, they still are not using the available educational technology on a regular basis (see Tables 3, 4, 5, 6, and 7).

It is not enough to purchase the equipment, it is also important to have support and be empowered to become effective learners themselves. As an example, in this study many universities have computer rooms for students and offer technology courses. Almost every faculty member in Turkey has a personal desktop or laptop computer (Turkmen & Pedersen, 2005; Usun, July 2003b). Yet, the results showed that Turkish faculty members with degrees from Turkish universities did not use educational technology in their classrooms (see Tables 3, 4, 5, 6, and 7). The data from this study also reflects that the differences observed among faculty rank were mainly found between "Instructors and Assistant Professors" (see Tables 3, 4, 5, 6, and 7). One possible explanation is that most faculty members in Turkish universities have a Ph.D. In order to earn your Ph.D. degree, you must take technology courses, and have proficiency in the English language. This provides opportunities to read and understand current research and new approaches that utilize technology for education. It would seem that assistant professors have an advantage over instructors and are able to gain a broader understanding of technology through their program of study and subsequent reading and study. On the other hand, a lack of effective leadership and a lack of confidence to try technology integration themselves may be the primary reasons why technology integration is not being accomplished. Munday, Windham, and Stamper (1991) and Davies (2001) found that older teachers lack the confidence to use technology and prefer not to change their teaching style.

There might be many reasons for why older Turkish faculty members are one step behind where they need to be. They might lack the time and motivation to learn technology skills or use technology. Technology could be very intimidating for many because learning how to use new technology always requires new learning, especially in the current rapidly changing educational

system. Older Turkish faculty members must become more informed about educational technology and become more involved in integrating technology in their classrooms. Turkey needs more science education faculty members, like assistant professors, using technology to improve the learning environment for their students. In turn, their students (pre-service teachers) will improve the learning environments for their K-12 students.

This study also showed that Turkish faculty members with Turkish degrees do not have ability to use technology efficiently in science classes. According to current OECD research (over 250 thousand 15 years-old students from 41 countries), Turkey is significantly behind many other OECD countries in science, problem solving in math, and reading, (Elevli, 2004). This corroborates the current study and other researchers who found that the most common reasons given for the low level of computer use in schools are limited access to equipment and lack of training (Akkoyunlu, & Orhan, 2001; Saglik, & Ozturk, 2001; Usun, 2003; Yedekcioglu, 1996).

From the current study, it is evident that these new professionals believe that technology support should become an integral part of teacher education and classroom curricula (see Tables 3, 4, 5, 6, and 7). New model programs should be characterized by required courses for pre-service teachers which teach them how to use instructional technologies and expose them to technology-rich higher education classrooms.

RECOMMENDATION

Technology has captured primary role in education. Global ICT was constructed by developing information technology and affected the structure of education and learning environment of education. Thus, computer, television, digital devises, and satellite have been using in order to teach as a powerful tool for children's learning by doing. We think that technology must be thought of as an integral component of the curriculum, a chameleon-like tool that can be used with almost any content. Computers can be used as writing tools, spreadsheets, and mathematical problem-solvers.

In developing Turkey, educational technology paid attention and placed in Turkish education system. Most importantly, computer has been integrated the science education curricula. In order to incorporate technology more fully into the classroom, teachers should be provided with the time and support to explore technology on their own. The government should provide the time ands pace for teachers, who now suffer from larger classes and more responsibility than ever, to take a break from teaching to start learning. Moreover, teachers should be treated like the professionals they are. Teacher creativity is a powerful force for positive educational change, but it can thrive only if it is unleashed and supported by Turkish government.

Finally, the Turkish politics and educators should make their interpretations of the current-desired knowledge gaps between Turkish faculties and somewhat confident that the technology aligns with standards, supports inquiry, advances students learning, then proceed in good conscience that the time and money invested in the technology should wisely spent. The modern technology that could potentially be incorporated into science curricula and teacher preparation program seem to be increasing at a rapid rate. And we do not forget that “technology alone does not create educational change. The power is not in the tool but in the community that can be brought together and the collective vision that they share for redefining classroom learning (Riel 1990, p 35)”.

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