PROSPECTIVE MATHEMATICS TEACHERS' ATTITUDES TOWARDS LEARNING MATHEMATICS WITH TECHNOLOGY

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ABSTRACT

Role of technology which is an important tool for new approaches in learning mathematics is rapidly increasing at focus point of learning mathematics with new designs. One of the biggest factors at learning and instructing technology based mathematic education is attitudes of mathematics teachers towards technology. At this study, attitudes of prospective mathematics teachers to technology based learning mathematics was analyzed and results showed that attitudes of prospective mathematics teachers are not wanted level.

Keywords: Attitude, Learning Mathematics, Technology, Prospective Mathematics Teacher

INTRODUCTION

Developments at science and technology have effected education with all dimensions like other disciplines. These rapid developments composed information societies and there became a compulsory to follow new technologies and adapt these developments to daily life. Nowadays, computers which are seen most effective interactive device and most effective individual learning technology entered to education systems and composed new approaches to school systems and learning process, developed new dimensions to existence models supplying information transfers. (Uşun, 2004). Using computers in education and instruction is a new success and this success depends on two factors; first is to understand new developments correctly and second is to develop a positive attitude about new developments (Hızal, 1989). Wiburg (1991) examines the discussion of technology from point of the teachers in education. The content reflects what students should know, the changes of teachers about their roles, new evaluation methods, developments of computer-based courses. The article includes the importance of technology and changeable role vision of teachers based on the technology included courses. Constructivist perspective also reflects and requires the role of the technology importance in education. There are many components of computer that facilitate the easy, stable and meaningful learning of students (Duffy, et. al., 1992). In the bundle, at the process of implementing computer aided instructions attitudes of teachers and prospective teachers gain importance.

Computer-based technology is changing the character of mathematics. Computers not only introduce new areas of mathematics but bring with them new ways of thinking about mathematics(Monaghan, 1996). Using information technologies effectively at mathematics education is a subject that commonly discussed. (Cockcroft, 1982; Howson&Kahane, 1986; NCTM, 1989; Graf et al., 1994; Ersoy 1994). However, computers, one of the most important parts of our socio-cultural life, can not be integrated mathematics education with same speed Baki(2002), %25 of teachers in America, % 15 of teachers in France are willing to use computer aided environments in mathematics education and for their professional developments. In addition, one of the important factors that we meet is attitudes of prospective mathematics education teachers to technology. To determine attitudes of prospective mathematic teachers will play very important role to shape mathematics learning environments. Role of determining teachers' attitudes will be important determining attitudes of students toward technology.

Attitudes are commonly distinguished from beliefs in that attitudes are moderate in duration, intensity and stability and have an emotional content, while beliefs become stable and are not easily changed (Mayes, 1998; McLeod, 1992; Pajares, 1992). Attitudes depended on more organized with long term feelings, beliefs and behaviors shape view of perceptions of prospective teachers on profession. (Kaplan ve İpek, 2002). Attitudes effecting behaviors is individual, not temporary and a phenomena effecting decision making process. Determining attitudes of prospective mathematics teachers will be an indicator to estimating educational environments that they will use their profession. In order to be reflective on the usage of technology and its facilities, there should be examination of the attitudes of prospective mathematics teachers towards technology.

Aim of this study is to investigate prospective mathematics education teachers' attitudes to technology based learning mathematics. Attitudes of prospective mathematics education teachers were analyzed using "The Mathematics and Technology Attitudes Scale" developed by Pierce,R.,vd(2007). This scale is composed from five dimensions which are Mathematics confidence, confidence with technology, attitude to learning mathematics with technology, behavioural and affective engagement in learning mathematics

Mathematics Confidence(MC):

Confidence Galbraith and Haines (1998) define mathematics confidence as evidenced by students who believe they obtain value for effort, don't worry about learning hard topics, expect to get good results and feel good about mathematics as a

subject. Students with low confidenceare nervous about learning new topics, expect that all mathematics will be difficult and worry more about mathematics than any other subject as students with high mathematics confidence show above mentioned performances We have restricted our meaning of the term to a prospective mathematics teacher's perception and assurance of him/her ability to attain good result in mathematics.

Confidence with Technology (TC):

Vale and Leder(2004) in viewing students' attitudes to technology as being defined by yhe students' perceptions of their achievement and their aspiration to achieve in these disciplines. The event deal with responses as" I have a mathematical mind or I can get good results in mathematics" is actually to similar the components of mathematical confidence.

Affective and Behavioral Engagement (AE-BE):

Engagement of the learner is an important factor in successful achievement and is a construct of interest in related subject. Fredricks, Blumenfeld and Paris(2004) see engagement as multifaceted with three components: behavioral engagement (positive conduct at school, involvement in learning tasks and participation is school-related activities), emotional engagement(affective reaction to school and classroom activities including freedom, happiness and feelings of belonging) and cognitive engagement(psychological investment in learning or cognition and strategic area).At this study; components for determining attitudes of prospective teachers are restricted with affective engagement and behavioral engagement

Attitude to learning mathematics with technology (MT):

At this stage, study is focused on prospective mathematic teachers' skills using computer aided instruction and beliefs about computer aided mathematics using interactive software like LOGO, Excel, derive. If prospective mathematic teachers does not have enough information or if can not take enough interest, it is obvious that information technologies will not be wanted level for mathematics education

METHOD

Participants of study where chosen from Atatürk University, Kazım Karabekir Education Faculty, Department of Primary school Mathematics Education 134 last semester students in 2006/2007 spring season. To determine attitudes of prospective teachers to technology "The Mathematics and Technology Attitudes Scale" which developed by Pierce,R.,vd(2007) used and scaled 1-5 level as lykert type. Minimum grade that can be obtained from this scale is 20 and maximum grade is 100. At the scale 3,5(70 over 100) and upper are determined as wanted attitude level and 2,5 (50 over 100) and above grades are accepted as unwanted attitude level. Grades between 51-69 are accepted as undecided prospective teachers. SPSS software and statistics techniques were used to analyze obtained data. In addition comparing all sub data One Way Anova and Sheffe test were used.

FINDINGS

To make a general evaluation about attitudes of prospective mathematics teachers to technology based learning, data are shown at Table-1 obtained from "The Mathematics and Technology Attitudes Scale".

Table 1: General means of prospective teachers to technology based mathematics education

	N	Minimum	Maximum	Mean	Std. Deviation
Attitude	134	45,00	92,00	67,38	9,57

If an evaluation is made regarding each prospective teacher's grades, we can say that attitudes of prospective mathematics education teachers are not wanted level. According to evaluation system shown above; there is a ratio of %40.3 of having high level of attitude and %55.2 of undecided level and %4.5 ratios for low level attitudes. To investigate elaborately attitudes of prospective teachers towards technology, five sub categories must be analyzed.Table-2 shows attitudes of teachers at the 5 sub categories.

Table2: Data related with attitude subcategories.

Sub Categories	N	Min.	Max.	Mean	Std. D.
Mathematics Confidence (MC)	134	8,00	20,00	14,63	2,70
Technology Confidence(TC)	134	4,00	20,00	11,57	3,58
Affective Engagement(AE)	134	6,00	20,00	14,99	2,92
Behavioural Engagement (BE)	134	8,00	19,00	14,46	2,82
Use of technology to learn mathematics(MT)	134	4,00	19,00	11,73	3,24

Analyzing the values from Table-2, Technology and confidence is lowest attitudes grades and affective and behavioural engagement is highest attitude grades ($\overline{X}_{TC} < \overline{X}_{MT} < \overline{X}_{BE} < \overline{X}_{BE} < \overline{X}_{AE}$). In addition, technology confidence and use of technology to learn mathematics grades are lower than other sub categories. This results show that, although prospective

teachers have positive affective and behavioral attitudes to learning mathematics with technology, prospective teachers have problems about confidence to technology based mathematics education. To analyze statistically if there is a meaningful difference or not, ANOVA analyze applied and results are shown at Table-3

Table- 3: One Wav Annova results for Attitude subcategories

Variance Resource	Sum of Squares	df	Mean Square	F	p
Between Goups	1510,737	4	377,684	39,978	,000
Within Groups	6282,	665	9,447		
Total	7793,207	669			

Table-4: Sheffe test results between attitude sub categories.

I(Subcategory)	J(Other Categories)	Mean Difference(I-J)	Sig
BE	TC	2,888*	,000
	MC	-,171	,995
	AE	-,529	,737
	MT	2,731*	,000
TC	BE	-2,888*	,000
	MC	-3,059*	,000
	AE	-3,417*	,000
	MT	-,156	,996
MC	BE	,171	,995
	TC	3,059*	,000
	AE	-,358	,923
	MT	2,903*	,000
AE	BE	,529	,737
	TC	3,417*	,000
	MC	,358	,923
	MT	3,261*	

*.Mean difference is significant at the .05 level

There is a meaningful difference when we analyze attitude sub categories shown at Table-3. To determine categories having meaningful differences .05 probability level Scheffe test applied and results are shown at Table-4

CONCLUSIONS

For more effective learning, importance of educational technology is accepted values at all disciplines related with education. In spite of the case, school mathematics' benefit process from the technology could not rapidly develop in Turkey as the world. When we look form Theory of "Spreading new developments" (Rogers, 1995) perspective, there are some stages; (a) to get information about innovation (b) composing attitudes about innovation (c) to accept or refuse innovation (d) applying innovation (e) to apply decisions related with innovation. Consequently, to implement any innovation, composing and knowing attitudes about these new technologies gain importance. One of the biggest problem implementing or applying any innovation to schools is negative attitudes of managers of school to innovation. (Hızal, 1988; Deniz, 1994; Altun, 2002).

At this process we can say that attitudes of prospective mathematics teacher are not wanted level depending on results of this study. At this study which attitudes and mathematics education are analyzed at five subcategories, prospective mathematics teachers' attitudes, especially at confidence with technology and use of technology to learn mathematics categories are too low and other categories are higher comparing these two categories. Problems of prospective teachers which have higher attitude grades at behavioral and affective management for confidence about technology based mathematics education are related with education that they had their previously life. Reason of not having wanted level of confidence at attitudes about technology for behavioral and affective management categories is related with usage of information technology in Turkey. It is an obvious fact that, information technologies are not at higher level using education and society and importance of information technologies is an important factor that is claimed every discipline. At this time, we face an important concept which is "Educational Technology Literacy" .Confidence problems about using technology for prospective teachers are related with not knowing how to use calculator, or software like Logo, Excel or Capri during process of learning and can not use them effectively.

In addition prospective mathematics teachers have problems making connections applying new information technologies to own field of study because unnecessary and crowded technical properties (voice, colors, detail functions) that new technology consists(Baki, 2002). At this time, there can be a priority for composing technology based mathematic education environments at curriculum of departments of mathematics education. Instead of giving general information about software and technological instruments, there must be activities that will make learning process stable. In addition composing applications between lifelong learning and technology will be important composing multi way interactions. Our study is restricted with our sample and similar studies at different regions with different numbers can enrich these studies.

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