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AN ANALYSIS OF TURKISH PROSPECTIVE TEACHERS' PERCEPTIONS ABOUT TECHNOLOGY IN EDUCATION

[*Análisis de la percepción de futuros profesores turcos sobre tecnología en educación*]

by

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Abstract

The successful integration of technology into education has been requiring teachers to have appropriate perceptions about technology. By considering this requirement, the aim of this study was to analyze technology perceptions of Turkish elementary prospective teachers in terms of computer competency skill and learning styles. The study was conducted with 591 elementary prospective teachers. As a result of the study, it was found that there is a significant main effect for computer competency level, but there is no significant main effect for learning styles and no significant interaction between perceived computer competency level and learning styles

Keywords

Teaching, Teaching strategies, Technology perception, Learning styles, Computer competency.

Resumen

La exitosa integración de la tecnología en la educación requiere profesores con una percepción adecuada de la tecnología. Teniendo en cuenta este hecho, el objetivo de este estudio fue analizar la percepción de la tecnología de futuros maestros turcos de primaria, en términos de competencia con el ordenador y los estilos de aprendizaje. El estudio se realizó con 591 futuros maestros de primaria. Como resultado del estudio se constató que existe un efecto principal significativo para el nivel de competencia informática, pero no hay efecto significativo para los estilos de aprendizaje ni interacción significativa entre el nivel percibido equipo de competencia y los estilos de aprendizaje.

Descriptores

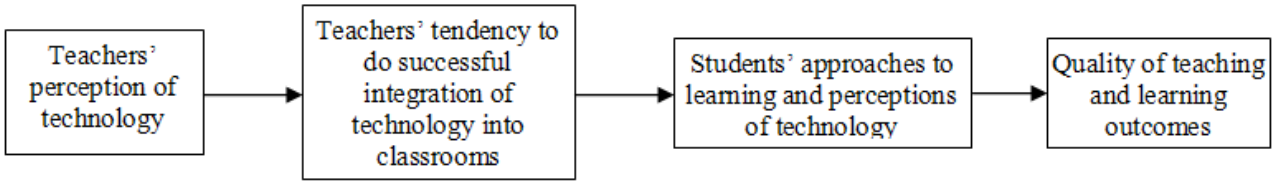
Docencia; Estrategias docentes; percepción de la tecnología, estilos de aprendizaje, competencia informática

Introduction

Perception is basically to attach personal meanings to internal and environmental inputs received through the senses and neural impulses (Schunk, 2000). Personal meanings attached to any input are determinative factors in processing of this input. The perception has been influenced by many factors such as customs, habits, education and motivation (Thinkquest, 2007). In fact, it is more true to say that there is a correlation between personal perception and factors mentioned above. Perception can conversely affect motivation, understanding, personal interpretations of something, and attempts to do things which are important parts of habits and thoughts (Vaughan, 2007).

The perceptions of people should not be considered to be unaffected characteristics from social life. The perceptions have been influenced by cultural and historical factors such as speech and tool use which are important social factors (Vygotsky, 1978). The perception about social events is one of the most significant parts of social changes. In addition, social changes are always related to technological developments; TV, computers, mobile phone etc. are important examples to initiators of social changes. Therefore, determination of perception on technology is an important step for planning, processing and evaluating the integration of technology into any environment such as classrooms or laboratories (İşman, 2003). Technological developments have many effects on various aspects of education. In today's world of education, successful integration of technology into learning and teaching processes which are important aspects of education can lead to enhanced learning outcomes (Cope & Ward, 2002). The perception of teachers has been affecting the students' approaches to teaching and learning and indirectly quality of learning and teaching outcomes (Trigwell, Prosser & Waterhouse, 1999). When taken into account students' learning outcomes and students' perceptions or approaches, impact of teacher's perception of technology on students' perceptions of or approaches to learning can be illustrated in Fig1.

Figure 1 - Relationship between teachers' perception of technology and students' learning outcomes



Teachers' perceptions about technology are affected by some variables. Two of the variables that are the main points of this study are computer competencies and learning styles of prospective teachers. As the first variable, the learning style concept describes individual differences related to the learner's preference for employing different phases of the learning cycle. With the effects of our hereditary characteristics, our experiences, and the demands of our present environment, we develop a preferred way of choosing among the four learning modes. We determine and resolve the conflict between being concrete or abstract and between being active or reflective in patterned, certain and characteristic ways (Kolb & Kolb, 2005). If the learner is to be more successful in any field, he or she needs four different types of ability. These are Concrete experience ability (CE), Reflective observations ability (RO), Abstract conceptualizaiton ability (AC) and Active experimentation (AE). That means, the learner is to be able to involve her or himself fully, openly and without bias in new experiences (CE); the learner must be able to observe and reflect on the experiences from different perspectives (RO); the learner is to be able to create concepts, ideas and thoughts that integrate her or his observations into logically certain theories (AC) and the learner must be able to use these theories in problem solving process and to make decisions (AE) (Kolb,1981). By considering these abilities, four types of learning styles were described; the diverging composed of (CE) and (RO), the assimilating composed of (AC) and (RO), the converging composed of (AC) and (AE) and the accommodating composed of (CE) and (AE) (Kolb, Boyatzis & Mainemelis, 2001).

As the second variable, the concept of perceived computer competency is a type of perceived self-efficacy. The perceived

computer competency or perceived self-efficacy on computer competency is one's beliefs about his or her capabilities to produce designated levels of performace on computer and about her or his statement to have enough knowledge about computers (Bandura, 1994). This self-referent beliefs have an impact on thoughts, feelings, actions and perceptions. Therefore, perceived computer competency is a critical element in successful performing of computer based tasks and help determine what individuals do with the knowledge and skills they have (Schunk & Pajares, 2001).

That there is a great knowledge increase in the world and usefulness of educational technology in classroom is supported by many studies, prospective teachers should have appropriate perceptions about technology for future educational aims. Perception about technology of prospective teachers may determine the tendency for use of technology by prospective teachers for educational aims. For finding appropriate way to educate them for future, the determination of their perceptions in terms of various personal aspects may provide a data set. In this study, the aim is to assess the prospective teachers' perceptions about technology in terms of computer competencies and learning styles.

Method

Participants

The study included 591 elementary prospective teachers who were enrolled in the different grades of five different education faculties in 2006-2007 semesters. The elementary teacher education in Turkey used to cover four years. The study consisted of nearly the same proportion of prospective teachers in each of the different grades. The number of participants for each grade were the following; 140 for the first grade, 169 for the second grade, 127 for the third grade and 155 for the forth grade. 245 of the participants were male prospective teachers, 346 of the participants were female prospective teachers. In addition, the age range for the participants was from 18 to 25.

Instruments

The survey method was used for the study. To collect the data about learning styles, "Kolb's Learning Style Inventory" which was established on four fundamental quadrants including Accommodative, Divergent, Assimilative and Convergent was used. This inventory was adapted to Turkish and its validity and reliability was reevaluated by Aşkar and Akkoyunlu (1993). As a result, they found that it is valid and reliable for determining the learning styles in Turkish cases. This inventory has 48 items which are included in four main categories. Therefore, each style has 12 items. The time given for applying the inventory is 10 min. For the each learning style, range for scores is from 12 to 60. So, the total score for all items should be 120. As another data collection tool, "Technology Perception Scale" developed by Tınmaz (2004) was used for collection of data about prospective teachers' perception about technology. It was a five-point scale (Likert type). The scale has two factors; "belief of the positive effect of technology in education" (factor 1), "effects of undergraduate program" (factor 2). The values of the Cronbach Alpha of these factors were determined as .89 for factor 1 and .81 for factor 2. The value of Cronbach Alpha coefficient for complete scale was calculated as .86 and split-half coefficient was .91. The scale has 28 items. As a last tool, "Computer Competency Scale" developed by Tınmaz (2004) was used for determining the computer competency level of prospective teachers. This scale has only one factor. The Cronbach Alpha coefficient of scale was calculated as .87 denoting a satisfactory reliability. This scale has 10 items regarding the competencies which were determined by knowledge from literature (Operating System, Word Processor, Internet, Basic Concepts, E-mail, Spreadsheets etc.) and it was a three-point competency scale (Not Competent , Intermediate, Competent).

Procedures

The study covered the prospective teachers from two different universities, Karaelmas University, Kirikkale University, Cumhuriyet University, Ahi Evran University and Kastamonu University, Primary Education Department in 2006-2007 spring term, who participated on a voluntary basis. The "Kolb's Learning Style Inventory", "Technology Perception Scale" and the "Computer Competency Scale" was administered to the participants at the same time. Then, the data gathered from the study was transported into an SPSS sheet. The analysis for important descriptive values was carried out by considering the frequency, mean and standard deviation. After that, a 4x3 ANOVA design was conducted to evaluate the effects of three perceived computer competency levels and four learning style types on the technology perception of the prospective teachers.

Results

The results for descriptive analysis and ANOVA test of the study are presented in this part of the article.

The means and standard deviations for scores on "Technology Perception Scale", frequencies in terms of three important variables, and "Learning Styles Inventory" in terms of different learning styles are presented in Table 1 and Table 2.

Table 1 – Descriptive of participants

Technology Perception Scale Scores			
Descriptive	n	M	SD
Gender			
Male	245	3.98	.54
Female	346	3.96	.48
Home Computer			
No	350	3.89	.51
With Internet	161	4.09	.42
Without Internet	80	4.06	.57
Competency			
Novice	83	3,80	.44
Intermediate	358	4,10	.50
Competent	150	4,26	.53
Total	591	3.97	.50

Descriptive for Scores of Total Technology Perception and Its Factors of Prospective Teachers in Terms of Gender, Having a Home Computer and Computer Competency Level

Table 2 - Learning styles

Learning Styles of Participants			
Learning Styles	n	M	SD
Assimilative	232	3.97	.48
Divergent	162	4.05	.49
Convergent	102	3.87	.58
Accommodative	95	3.95	.48
Total	591	3.97	.50

Descriptive for Learning Styles of Prospective Teachers

For 4x3 ANOVA design, learning styles of the prospective teachers described as assimilative, divergent, convergent, and accommodative, and perceived computer competency levels of the prospective teachers determined as novice, intermediate, and competent were considered as the independent variables of the study. In addition, the scores of the prospective teachers on the "Technology Perception Scale" were considered as the de-

pendent variable of the study. The experimental design of the study is presented in Table 3.

Table 3 - Experimental Design

Independent Variable	Value	Dependent Variable
Computer Competency Level	Novice / Intermediate / Competent	Technology Perception Total Score
Learning Styles	Assimilative / Divergent/ Convergent / Accommodative	Technology Perception Total Score

The means and standard deviations for scores of the prospective teachers on "Technology Perception Scale" and frequencies as a function of the two factors are presented in Table 4.

Table 4 - Descriptive of technology perception scores

CCL	Learning Styles	n	Mean	SD
Novice	Assimilative	38	3.66	.37
	Divergent	18	3.82	.55
	Convergent	15	3.59	.29
	Accommodative	12	3.77	.28
Intermediate	Assimilative	141	3.98	.48
	Divergent	93	3.97	.49
	Convergent	66	3.86	.55
	Accommodative	58	3.89	.51
Competent	Assimilative	53	4.13	.45
	Divergent	51	4.26	.38
	Convergent	21	4.08	.74
	Accommodative	25	4.18	.40
Total		591	3.97	.50

Means and standard deviations of Technology Perception Scores by Computer Competence Level (CCL), Learning Styles of Prospective Teachers

The ANOVA indicated no significant interaction between perceived computer competency level and learning styles, $F(6, 579) = .52$, $p = .80$, partial $\eta^2 = .01$, no significant main effect for learning styles, $F(6, 579) = 1.83$, $p = .14$, partial $\eta^2 = .01$, but significant main effect for computer competency level, $F(6, 579) = 21.28$, $p = .00$, partial $\eta^2 = .07$.

Table 5 - Two-way ANOVA

Source of Variance	SS	df	MS	F	*p*
Learning style	1.27	3	.42	1.83	.141
Computer competency level	9.88	2	4.94	21.28	.000
Learning style* Computer competency level	.72	6	.12	.52	.797

The results of total analysis of Technology Perception Scores by Computer Competence Level (CCL), Learning Styles of Prospective Teachers

The main purpose of the study was to determine the effect of the variables of perceived computer competency level and learning styles on prospective Turkish teachers' perceptions about technology in education. The main effect of computer competency level indicated that the prospective teachers

at high level of computer competency tended to have a greater positive perception of technology in education. The main effect of learning styles indicated that the prospective teachers at any level of learning styles did not tend to have a greater positive perception of technology in education than the others. Overall, the 4x3 ANOVA indicates a significant difference between the perceptions of the prospective teachers who perceive themselves to be at different computer competency levels. The competent prospective teachers have more positive perceptions than the novices and they also have more positive perceptions than the intermediate prospective teachers. Lastly, the intermediate prospective teachers have more positive perceptions than the novice prospective teachers.

Conclusion

In this study, the perceptions of prospective teachers about technology in education were analyzed in terms of different variables: learning styles and computer competency level.

According to results of this study, it was seen that 39.3% of prospective teachers had assimilative, 27.4 % of prospective teachers had divergent, 17.3 % of prospective teachers had convergent and 16.1 % of prospective teachers had accommodator learning style. In her study, which consisted of 202 participants, Hasırcı (2006) determined that 41.1 % of prospective teachers had assimilative, 33.2 % of prospective teachers had divergent, 17.3 % of prospective teachers had convergent and 8.4 % of prospective teachers had accommodator learning style. This result was consistent with the study presented. After the determination of learning styles of prospective teachers, the results of two-way ANOVA showed that there is no significant difference between scores on the perceptions about technology in education of prospective teachers who had different learning styles after total score analysis (p>.05). As a result, it was found that the perception levels about technology in education of prospective teachers would be same for prospective teachers who have assimilative, accommodative, convergent, and divergent learning styles. This result might be explained by previous educational histories of and examinations taken by the prospective teachers, or by common educational environment and events shared by them. Before their university education, they were enrolled in the same context during high school education, and they did not take any course regarding technology in education. This might be a factor in determining no difference between their scores on technology perception in education. At the same time, the examinations taken by them for entering teacher education and their results on these examinations were the same or similar to each other. This might be an important factor in the similarity of their expectations and perceptions about technology. In addition to these, common educational environment and events shared by them at university may be effective factors in their perceptions. For example; lecturers of university technology courses might construct general perceptions about technology because of their approach to the course and students, or there might be many problems with technology opportunities, such as not having enough computers in labs.

When the results of this study were looked at in terms of computer competency level, it was seen that 14 % of prospective teachers had novice, 60.6 % of prospective teachers had intermediate, and 25.4 % of prospective teachers had competent levels. According to the results of two-way ANOVA, there was a significant difference between scores on the perceptions about technology in education of prospective teachers who were at different levels of computer competency for total scores (p<.05). In addition, when taken into account "Post Hoc" test (Bonferroni), it was determined that there was a significant difference between scores on the perceptions about technology in education of prospective teachers who were at "novice" level of com-

puter competency and those who were at "intermediate" level of computer competency ($p<.05$). In other words, prospective teachers who were at "novice" level of computer competency have fewer positive perceptions about technology in education than prospective teachers who were at "intermediate" level of computer competency. In addition, there was a significant difference between scores on the perceptions about technology in education of prospective teachers who were at "novice" level of computer competency and those who were at "competent" level of computer competency ($p<.05$). Consequently, prospective teachers who were at "competent" level of computer competency have more positive perceptions about technology in education than prospective teachers who were at "novice" level of computer competency. Lastly, the results of the study showed that there is no interaction between learning styles and computer competency levels of prospective teachers on total technology perception scores of prospective teachers. These results might be related to the relationship between computers and technology in education. Computers are inseparable parts of educational technology. Computer competency levels might reflect points of view about technology in education. Perceptions about technology, which consists of computers, must be correlated with perceptions about computer competency. From this point of view, the perception level about technology in education of prospective teachers must be consistent in increase with their level of computer competency. The results of the study supported this relationship between perception levels of technology in education and level of computer competency. There is another study that is consistent with these results. According to results of the research conducted by Brubaker (2004), teachers who perceived themselves as competent with respect to technology competency had more positive beliefs about technology in education. In addition, as another result of this research, it was found that there was no statistical significance among the individuals who had different learning styles with respect to beliefs about technology in education.

This study has been providing the literature with additional empirical data for technology perceptions of prospective teachers and giving data for cultural comparisons with moderate sample size from Turkish context. Again, the results of this study might be useful for further meta-analysis and modeling studies.

Suggestions

In educational settings for the future, technology-based approaches will probably become predominant in teaching and learning processes. So, teacher competency in the selection and application of appropriate technology in education will be important. Teachers´ perceptions about technology in education will determine their tendencies to appropriately use technology in education and to use programs' prepared to increase their competencies in the future. In addition, it might be expected that prospective teachers who have more positive perceptions about technology in education will use technology more effectively for learning and teaching. According to the results of this study, prospective teachers who have different learning styles as related to Kolb's learning styles have the same perceptions about technology in education, but other approaches to assessing learning styles might provide cues for determining the difference between perceptions about technology in education of prospective teachers. Therefore, perception differences of prospective teachers about technology in education should be examined in terms of other learning styles approaches. In addition, learning style based technology classification should be done for effective technology use in education.

The results for computer competency level of prospective teachers showed that the computer competency level of prospective teachers should be determined before any

course or application regarding technology use in education is chosen and that appropriate applications should be selected for prospective teachers taking into consideration their levels of computer competency. To provide positive technology perception to prospective teachers at "novice" and "intermediate" levels, additional technology based applications consistent with their interests should be done used.

As a last point, to provide a more positive perception about anything, a clear description of that thing should first be given, because sometimes uncertainty might cause more negative perception. After this main point, other applications and activities should be carried out. For example, existence of uncertainty related to lack of knowledge about descriptions of basic parts and processes of a computer might cause negative perceptions of the technology even if the individual has the basic skills to use a computer. In the context of teacher education, some types of examinations, including multiple-choice and other paper-pencil formats, might also increase awareness of the uncertainty by including only questions on the names and descriptions of the parts and processes of a computer and not the questions on basic skills.

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