PRIMARY SCIENCE TEACHERS' ATTITUDES TOWARD COMPUTER ASSISTED LEARNING

(İlköğretim Fen Bilgisi Öğretmenlerinin Bilgisayar Destekli Öğrenmeye Karşı Tutumları)

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ABSTRACT

Computer assisted learning appears to be one of the most crucial products in computer technology for teaching and learning. While these changes in technology and developments are happening, it would be meaningless to leave education out of this process and insist on continuing the use of traditional methods. It is not possible to reach the goals that have been set by using only the method of traditional teaching and leaving the fast developing technology out. Fast improvements in new technologies and computer assisted learning systems have gained more importance especially for teaching primary science classes. Computer assisted learning has become inevitable in today's education programs. The success of the any educational program will depend upon the attitudes of the teachers and willingness to embrace the technology. Therefore, it is necessary to address the teachers' attitudes toward computer assisted learning. The purpose of the study is to determine the attitudes of the primary science teachers toward computer assisted learning and describe measures the relationship between attitudes and the gender. A Likert type survey was prepared about computer assisted learning. This survey was administreted to 132 science teachers working in state and private schools.

Key Words: Computer Assisted Learning, Science Education, Integration of Science and Technology, Attitude

ÖZET

Bilgisayar destekli öğrenme, bilgisayar teknolojisinin öğretme ve öğrenme alanında kullanımında oldukça önemli ürünlerden birisini oluşturmaktadır. Teknolojideki bu değişiklik ve gelişmeler sürerken, eğitimin bunların dışında kalması ve hala eski yöntemlerin uygulanmasında ısrar edilmesi anlamsız olur. Derslerde geleneksel öğretim yöntemini kullanmak ve hızlı ilerleyen teknolojiyi göz ardı etmek; eğitimde hedeflenen noktalara ulaşmada yeterli olmamaktadır. Yeni teknolojilerin ve bilgisayar destekli öğrenme sistemlerinin hızla gelişimi özellikle ilköğretim fen sınıflarında verilen derslerin aktarımı yönünden daha da önem kazanmıştır. Günümüzün eğitim programları için bilgisayar destekli öğrenme kaçınılmaz olmuştur. Herhangi bir eğitim programının başarısı, öğretmenlerin teknolojiye yönelik tutumlarına ve bu teknolojiyi kullanma istekliliklerine bağlı olacaktır. Bu nedenle öğretmenlerin bilgisayar destekli öğrenmeye karşı tutumlarının belirlenmesi gerekmektedir. Bu çalışmanın amacı ilköğretim fen bilgisi öğretmenlerinin bilgisayar destekli öğrenmeye karşı tutumlarını belirlemek ve aynı zamanda tutumlar ve cinsiyet arasındaki ilişkiyi ortaya çıkarmaktır. Bu amaçla, bilgisayar destekli öğrenmeye yönelik likert tipi anket hazırlanmıştır. Bu araştırma devlet ve özel ilköğretim okullarında çalışmakta olan 132 fen bilgisi öğretmenine uygulanmıştır.

Anahtar Kelimeler: Bilgisayar Destekli Öğrenme, Fen Eğitimi, Fen ve Teknolojinin Bütünleştirilmesi, Tutum

INTRODUCTION

The three most important things for making an information society are good education, creativity and perfection. Factors like growth in service technology, international competition as a result of globalization and revolution in information technology, don't guarantee a person's career all through his professional life. What is meant by this is that a person must be ready for new and higher level progress and to develop himself continuously.

Today, Computer assisted learning has proved itself to be a very crucial programme

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in the any educational system. Both from the point of view of the teachers and the students, attending the learning process can be thought of very beneficial for the participants whenever and wherever they wish to.

Public education must prepare students to make effective use of technology which they will need in the 21st century (Moursund, 1991).

For education to be successful, public schools must make current technologies available to students that are already available in the business world (Davis & Henry, 1993). For this transition to properly occur, students must become actively involved, and teachers must be given the resources and training needed to properly implement technology (Hill, 1992; Moursund, 1991, 1992; National Academy of Sciences [NAS], 1995; Pearlman, 1999; Stintson, 1993). In support of education's reform efforts, many schools and school districts across the nation have made monumental changes by incorporating technology into their restructuring efforts. However, the key to a successful partnership between educational reform and technology lies in educational leaders developing curriculum and instructional methods and goals that use technology as a support tool to improve the way teachers teach and children learn (Middleton & Murray, 1999; NAS, 1995; Sheingold & Tucker, 1990).

Today as we live the information technology, science education is also being searched. It is clear that a science education supported by technology will help related concept network system to occur in students' minds and provide a systematic way of thinking. In addition, by using information technology, possibilities are being prepared for individuals to be able to by their ideas and get answers. Apart from that, by providing the collective use of and education in

computer resources, economy in education is gained in terms of time, energy and quality. Moreover, motivation is provided in students and some concepts (such as mathematics formulas) can be comprehended more easily (Ross & Gray, 1998; Urdan & Maehr, 1995).

Unless science education is given as an information transfer based on experiment, it will be hard for the student to understand, physical & chemical events and the, biological fundamentals of life. It has been shown that a one-moment-moving image is 12 times more effective than a one-moment-sound in terms of information. Image and sound are superior to information that within the last 15 years in education supported by computer, a fast sliding through image and sound-based systems is observed.

Moss (1993) found that content-related software (more commonly referred to as Computer-Assisted-Learning or CAL packages) is still widely used and that science teachers are one of the biggest user groups.

In a meta-analysis study, Wise and Okey (1983) found an effect size of +.82 (under one standard deviation) on students' performance when computers were used in science instruction. The use of computer-assisted instruction has been found to improve the academic performance of below-average students in middle school (Lazarowitz & Huppert, 1993 Becker, 1986).

Little research has been carried out regarding teachers' knowledge of technology in Turkey. A recent study recommends that:

Science teachers must;

- be suitable equipped for the demands of modern times,
- search out and apply new teaching strategies in lessons,
- adapt knowledge technology to education on time.

An established trend in the literature (Nisbet, 1973; Steadman et al, 1978; Kyriakides, 1997; Carlsen, 1991; Ernest, 1989; Fennema et al., 1996; Raymond, 1997) supports the view that teachers' perceptions are one of the most critical factors for educational change. The importance of teachers' perceptions are also supported by research · on teachers' thinking (Calderhead, 1987).

Kyriakides points out that research into teachers' thinking shows:

Teachers posses a body of specialized knowledge through training and experience related to teaching methods, subject matter and child behaviour together with other information resulting from their experience of working with children in numerous contexts.

While the evaluation and assessment on the efficacy of computer use are yet to be known in this context, it is important to note that user acceptance and attitudes toward computers are critical in their successful implemen-tation. It is believed that an attitude is a mental and neural state of readiness, organized through experience and influence upon the individual's response to a situation. Theoretical and empirical findings suggest that once the user attitude is identified, any necessary steps to change the state by persuasive means may be possible (Khine, 2001)

The aim of the work reported here is to get concrete data from primary science teachers about adaptation of technology in science lessons in order to increase success in science.

This research is mainly concerned with Primary Science Teachers' Attitudes towards Computer Assisted Instruction. The import-ance of exploring the perceptions of the science teachers' can be attributed to the fact that research into these perceptions may contribute to teachers' meaningful involve-ment in the science education.

SAMPLE

This study is limited by opinions of 132 (101 state, 31 private schools) science teachers (%68 female, %32 male) who were on duty and had been teaching science in the academic year 2001-2002. The mean lenght of teachers' teaching experience was 14 years. Three teachers did not indicate their subject specialism, but 63 of the teachers who responded said they were science specialist, 66 said they were teaching science but that science was not their specialism (22 of the teachers were Physics specialists, 36 of the teachers were Chemistry specialists, 8 of teachers were Biology specialists).

INSTRUMENTATION

In this study, Practor's methodology was used. A researcher-made instrument was utilized in this survey. A Likert-type survey entitled Teacher Survey for Computer Assisted Learning which included 20 questions, was administered to primary science teachers. Teachers were asked to completed demographic data with a seperate sheet. Responses of agree-disagree were sought on question 1 through 20 concerning primary science teachers' attitudes regarding the computer assisted learning. A researcher-made instrument was utilized because no other measures were found in the research literature sufficient to measure the attitudes of primary science teachers' towards Computer assisted learning. The instrument was prepared by using data obtained from a pilot-survey study and meetings with 50 primary science teachers. As a result of suggestions and reviews by professors during and at the conclusion of this pilot study and after validity& reliability studies were done to this pilot-survey, minor adjustments were made so the instrument would be acceptable for use in this study. A Likert type survey with 20 questions was administered to science teachers working in either state or private schools. For the

purpose of analyses, the categories strongly agree and agree were collapsed into the category "agree" while strongly disagree and disagree were collapsed into "disagree. The percentages of responses for the categories agree, neutral, and disagree for all eleven items are presented in figures. Cronbach's coefficient alpha was used to ascertain the reliability of the overall revised teacher survey instrument utilized in this study. With the 20 questionnaire items, a coefficient alpha of .78 was obtained. A principal components factor analysis, followed by a Varimax factor rotation, of the questionnaire data led to the clustering of items into two factors with Eigenvalues greater than one and accounting for no less than five percent of the variance. Factor 1 consisted of nine items: 1, 2, 3, 4, 5, 6, 13, 14, and 19 with factor loadings of .4 and above. These items were reflective of the advantages and importance of computer assisted learning and accounted for 30,8% of the variance. The coefficient alpha for Factor 1 was .81

Factor 2 was comprised of four items: 7, 15, 17, and 18 with factor loadings of .4 and above and yielded a coefficient alpha of .71. These items were reflective of disadvantages of computer assisted learning and accounted for 26,8% of the variance. Thus, these items were highly internally consistent and accounted for 57,6% of the variance.

RESULTS

The purpose of this study was to investigate primary science teachers' attitudes toward Computer Assisted Learning. Completed questionnaires were received from 132 primary science teachers who were on duty and had been teaching science in the academic year 2001-2002. Teachers had a mean of 80.79 (SD=4.79) on the total instrument regarding the Primary teachers attitudes towards computer assisted learning. With a possible range of 67 to 93, the mean of 80.79 was indicative of an overall belief that Computer assisted learning is helpful for primary science education.

The questionnaire revealed that teachers had a mean of 37.29 (SD=2.89) on Factor 1 with score ranging from 31 to 45. Similar to the score on the overall questionnaire, a score of 45 was indicative of positive attitudes regarding the belief that the advantages and importance of computer assisted learning was critical factor in science education. On Factor 2 teachers had a mean of 15.67 (SD=1.49) with score ranging from 8 to 19. A score of 19 was reflective of negative attitudes regarding the belief that the disadvantages of computer assisted learning, whereas a score of 8 was indicative of positive attitudes.

In Table 1 and Table 2, the percentages of agreement with each of items have been provided.

Table 1: Percent Agreement and Disagreement Reported by Teachers on Factor One Survey Items

Survey Item	Percentage Disagreement	Percentage Agreement
1. CAL is an alternative learning method.	1.6	99.4
2. CAL gives positive results on students who like to study individually	2.2	96.0
3. CAL provides students to reach more and detailed knowledge	2.8	95.5
4. CAL provides a rich learning environment.	1.5	97.8
5. CAL improves students' skills of learning by themselves.	3.0	93.7
6. CAL provides designated standards for students who are educated at different places and in different conditions	2.3	94.0
13. CAL increases students' motivation towards the lesson	12.1	87.9
14. CAL develops students' systematic thought construction	4.5	89.3
19. CAL provides to have permanent knowledges	6.1	93

Table 2: Percent Agreement and Disagreement Reported by Teachers on Factor Two Survey Items

Survey Item	Percentage Disagreement	Percentage Agreement
7. CAL doesn't create a social interaction as in schools.	2.3	92.4
15. CAL prevents to appear individual responsibilities	3.0	84.9
17. CAL doesn't give positive results in Science tests	0.8	91.6
18. CAL make students to be depend on learning environment.	7.6	81.1

Gender Differences

As shown in Table 3, the difference are marginal and t-test results show that the differences are statistically not significant [$t_{(130)}=1.27$, p>.01]. Female primary science teachers attitudes (X=81.16) are similar to male primary science teachers attitudes (X=80.02). It can be said that there is no relationship between towards computer assisted learning and gender.

Table 3. Mean Subscale Scores According to Gender (N=132)

Gender	Female	Male
N	90	42
X	81.16	80.02
S	4.88	4.55
sd	130	
t	1.27	
p	.207	

DISCUSSION

It appears that the Primary science teachers' attitudes toward computer assisted learning scale produced acceptable and respectable reliability coefficients. Significant correlations were also detected among the subscales and the total scale.

The findings of this study revealed that computer assisted learning must be an important part of education (Moursund, 1991). Inclusion of informational technologies into the curriculum depends upon the accessibility of these technologies. Teachers must see technology as an important and legitimate tool for teaching and learning (Middleton, 1999; Johnson & Johnson, 1996).

Gender differences in attitudes among primary science teachers in primary schools have been reported in many studies and findings suggest that differences are statistically not significant (Khine, 2001). However in Francis's (1994) study with secondary school students, she found that males are more enthusiastic about using computer and more confident in using them. Similarly Makrakis and Sawada (1996) reported their findings regarding gender, computer and other school subjects among Japanese and Swedish students. The results suggest that the boys are significantly higher in computer aptitude and liking than the girls in both countries.

In Turkey, many primary schools today have computer assisted learning laboratory to use computers in the science courses. In this study it was found that 51 % of the teachers have opportunity to use computer laboratories effectively and such an exposure may affect their attitudes toward computer.

In recent years teacher training programs focus attention on integration of the use of multimedia and internet to the school curriculum. Researchers have developed new instruments not only to measure the attitudes toward computer, but also to determine attitudes toward information technology which encompass the use of internet, World Wide Web, email and multimedia (Knezek & Christensen, 1998). Since the uses of communication and information technology in schools are rapidly increasing, further research is needed to measure the attitudes of the teachers toward the added dimensions of information technology.

Science teachers' roles and properties must be looked over again in order to form civilized society and make use of technology with traditional science knowledge.

Today teachers and managers must do research about information technology and approaches to technology. Beginning from now technological knowledge and new teaching methods must be applied and science teacher must educate inservice. Not only educate science teachers at inservice.

Also repeat it periodically. Inservice training of teachers must be provided and reinforced.

Research made ten years ago stated that teachers fear that computers will replace them. But they still continue their duty in 2004. At the same time computers have begun to enter our education system and they are used effectual in lessons. Teachers' responsibilities are increased because of the computer's entrance to schools. The leading role in Computer Assisted learning is taken by teachers.

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