

WCES 2012

Hacettepe University prospective biology teachers' self-confidence in terms of technological pedagogical content

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Abstract

This paper aims to determine the prospective biology teachers' self-confidence in technological pedagogical content at Hacettepe University and to compare it with respect to such variables as gender and grade levels. For these purposes, the scale for technological pedagogical content self-confidence, which was originally developed by Graham, Burgoyne, Cantrell and Harris (2009) and was adapted into Turkish by Timur and Taşar (2011), was used. The scale consists of 31 items and is four dimensional. The first dimension is the dimension of Technological Pedagogical Content Knowledge (TPCK), the second is the dimension of Technological Pedagogical Knowledge (TPK), the third is the dimension of Technological Content Knowledge (TCK), and the fourth one is the dimension of Technological Knowledge (TK). Cronbach Alpha reliability coefficient is .92 for the overall scale. The research sample was composed of the reachable 121 of the 134 students studying in the Biology Education department of Hacettepe University. In consequence, it was found that the prospective teachers' self-confidence in terms of technological pedagogical content was high, that there were no differences on gender basis, but that differences were available between the second and fourth year students.

Keywords: Self-Confidence, prospective biology teachers;

1. Introduction

Technology has been rapidly changing nowadays, and the place that education occupies in technology has been increasing in parallel to the change. In addition to improving the quality of education, another benefit of using technology in education is that it assures raising individuals who are knowledgeable about technology and who use technology. Generations who are raised through technology are inclined to use technology even after their educational period. Provided that we wish to catch up the developed countries, it is vital that we have individuals who are capable of using technology and who apply technology.

Fletcher (2003) states that technology-based teaching is the third revolution in education, and that we are at the beginning of a new era in education. The first is the written language. Anyone who gets access to the written records is regarded as having reached the knowledge. Sages, who were the only sources of knowledge, are no longer important. Books are the second revolution. In this way, knowledge has become accessible, available and usable. The third revolution is technology-based-teaching. Thus, the content of learning has become accessible, high quality and interactive.

Technology-based teaching increases productivity minimises the cost and time required for interaction, makes individual teaching financially manageable. In this way, it helps all the students learn (Fletcher, 2003).

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According to Gorder (2008), the most important factor in integrating educational technologies with the learning process effectively is the teacher's ability and efficiency to organise technology-based learning activities according to learners' needs. In other words, teachers' proficiency in using technological equipment effectively and in a planned way in a manner so as to improve the quality of teaching is also important (Inel et al., 2011).

Abilities described as proficiency are gained in the process of communication. A great amount of proficiency required for various life activities is obtained through the individual's own experiences (Kron and Sofos, 2003). Beginning at birth, every individual is capable of forming their own technological proficiency as long as they learn to act and think within any kind of technology and along with any kind of technology. This proficiency in technology, which is called functional, is learnt in the socialisation process. All the people being exposed to the influence of new technologies in modern societies gain functional technological proficiency. This is true for everybody- whether they are old or young, teachers or students. Individuals dealing with new technologies develop their own technological proficiency (Kron and Sofos, 2003). Teachers' self-confidence as well as their proficiency affects their use of technology (Oral, 2008). Therefore, determining prospective teachers' levels of confidence and the variables influential in this matter is considered important in assuring the effective use of technology in the learning-teaching process.

This study aims to determine the prospective biology teachers' self-confidence in technological pedagogical content at Hacettepe University and to compare it with respect to such variables as gender and grade levels.

2. Method

2.1. Research Model

This research, aiming to determine the prospective biology teachers' self-confidence in technological pedagogical content, uses a descriptive model.

2.2. Research Population and Sample

The research population was composed of 134 students of Biology Education in the Faculty of Education, Hacettepe University in the 2010-2011 academic year whereas the sample consisted of 121 students, who were reachable from the population.

2.3. Data Collection Tool

The scale for technological pedagogical content self-confidence, which was originally developed by Graham, Burgoyne, Cantrell and Harris (2009) and was adapted into Turkish by Timur and Taşar (2011), was used in this research. The scale consists of 31 items and is four dimensional. The first dimension is the dimension of Technological Pedagogical Content Knowledge (TPCK), the second is the dimension of Technological Pedagogical Knowledge (TPK), the third is the dimension of Technological Content Knowledge (TCK), and the fourth one is the dimension of Technological Knowledge (TK). Cronbach Alpha reliability coefficient is .92 for the overall scale.

3. Findings

3.1. Prospective Biology Teachers' Technological Pedagogical Content Self-Confidence

Table 1 shows the arithmetic averages and standard deviations concerning the scores prospective teachers received from the scale of technological pedagogical content self-confidence. The average for the prospective teachers' self- confidence scores was found as 122, and the standard deviation as 17.23. The maximum score receivable from the scale was 151.

Table 1. The Scores Prospective Teachers Received from the Scale of Technological Pedagogical Content Self-confidence.

	X	Ss
121	122,14	17,23

3.2. The Effects of Gender on Prospective Teachers' Technological Pedagogical Content Self-Confidence

As is clear from Table 2, the difference between averages for the scores male and female prospective teachers received from the scale of confidence is not significant according to the t test results ($p < .01$).

Table 2. The Scores Prospective Teachers Received from the Scale of Technological Pedagogical Content Self-confidence on Gender Basis

Gender	N	X	S	t	p
Female	101	121,45	17,20	0,99	0,321
Male	20	125,65	17,36		

$p < .05$

3.3. The Effects of Grade Levels on Prospective Teachers' Technological Pedagogical Content Self-Confidence

Tables 3 and 4 show the analysis results for the difference between score averages that the prospective teachers received from the scale of technological pedagogical content self-confidence on the basis of grade levels.

Table 3. The Averages and Standard Deviations Concerning the Scores Prospective Teachers Received From the Scale of Technological Pedagogical Content Self-Confidence According To Their Grade Levels

Grade level	N	X	Ss
1st year	36	118,58	16,27
2nd year	18	113,44	21,09
3rd year	21	126,33	13,89
4th year	19	130,68	12,04
5th year	27	123,41	18,29

Table 4. Variance Analysis Results Concerning the Scores Prospective Teachers Received From the Scale of Technological Pedagogical Content Self-Confidence According To Their Grade Levels

Source of variance	Squares total	Sd	Squares average	F	p
Intergroups	3616,127	4	904,032	3,278	0,014
Intragroups	31990,485	116	275,780		
Total	35606,612	120			

$p < .05$

As is evident from Table 4, a significant difference is available at the level of .05 between the prospective teachers' technological pedagogical content self-confidence scores. The Scheffé test was conducted so as to find from which groups the difference stemmed, and a difference in favour of the fourth years was found between the second and fourth year groups.

4. Discussion

The research results showed that the prospective biology teachers' self-confidence in terms of technological pedagogical content was high; and this is a finding parallel to the ones obtained previously in research studies concerning teachers' or prospective teachers' technological self-confidence which were conducted through differing

measurement tools (Erdemir, Bakırcı and Eydur, 2009; Smarkola, 2008). Although attitudes in favour of technology and self-confidence are the two important variables in using technology in education, this is not sufficient on its own. What is needed is the intensive use of technology. Hence, provided that prospective teachers are given the opportunity to use technology, it may be expected that next generations will be raised in the hands of those who are not afraid to use technology. The use of computers and of teaching- focused technology must be made obligatory in prospective teachers' in-class applications; moreover, courses requiring the use of computers must be emphasised. Thus, the individual will gain the habit of using technological components by applying, will benefit from technology in his or her professional life, and will not fall behind the age.

The current research has also found that technological pedagogical content self-confidence does not differ on the basis of gender. Several research studies are available on the fact that gender does not bring about a difference in attitudes towards technology (Shashaani, L. and Khalili, 2001; Işman and Çelikli, 2009). However, there are no research results concerning self-confidence. Another result of this research is the finding that there is a difference between the technological pedagogical content self-confidence of the 2nd and 4th year students in favour of the 4th year students. In this case, it may be said that - due to the experience with the use of technology- self confidence will rise as the grade level rises.

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