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The examination of prospective teachers' information and communication technology usage and online communication self-efficacy levels in Turkey

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Abstract

The concept of readiness to e-learning necessitates students possess a number of competencies, two of which are their ICT usage and online communication self-efficacy levels. Thus, in current research prospective teachers' ICT usage and communication self-efficacy levels with respect to some demographic variables were explored. 1693 volunteer prospective teachers constituted the sampling of the study. In present study, there were two scales, whose reliability coefficients are respectively .894, and .846. With regard to findings, it appeared that solely grade level has no statistically significant influence on prospective teacher' online communication self-efficacy levels. Further findings are discussed in the full paper.

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1. Introduction

It is an undeniable fact that the face of education is being changed by the rapid advancement of Information and Communication Technologies (ICT). Today, it has become almost impossible to envisage education without ICT. Hence, using computer, internet and other technological devices and/or capabilities effectively are of paramount importance for teachers with the goal of being able to keep up with current pedagogical approaches and incorporate

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modern technologies into education successfully. Aside from ICT usage self-efficacy, online communication self-efficacy is another indispensable asset to which today's teachers must definitely possess. It goes without saying that along with the change of medium where communication takes place the way people communicate to each other also changes. Since learning has much to do with communication, the way people learn changes too. As well known, McLuhan and Fiore (2001) puts forward that medium influences people and the way they act a great deal. Palloff and Pratt (as cited in Hung et al., 2010) revealed that shy students engage in online environments more than non-shy ones do compared to traditional environments. What is more, in the famous debate between Kozma and Clark, Kozma (1994) asserted that medium affects our learning. In short, as there are a number of media involved in e-learning environments like content management or learning management systems, it could be expected that that relating medium might have some impact on people, the way they communicate, and consequently the way they teach and learn.

There is a benefit of giving definitions of concepts investigated in current study before further discussing these concepts in that in some studies these concepts might mean quite different things. The first concept handled in this study is ICT usage self-efficacy. There is use in giving definition of self-efficacy first in order to comprehend what ICT usage and online communication self-efficacy are. The concept of self-efficacy was first added to literature by Bandura (1977) in the social learning theory. Bandura defined self-efficacy as an individual's own perception regarding organizing required activities and his/her being able to complete them successfully in an attempt to show a certain performance. Subsequently, by making use of Bandura's definition, Akkoyunlu, Orhan and Umay (2005) defined it as an individual's believe in his/her abilities rather than these abilities themselves. In this regard, Hung, Chou, Chen, and Own (2010) defined internet self-efficacy as follows: It is an internet user's trust towards his/her own ability to use internet. Under the lights of all above definitions, we may define ICT self-efficacy in a similar way. It is an individual's own believe towards how much he/she is good at using internet, computer and other related ICT technologies. As far as online communication self-efficacy is concerned, it might be defined as an individual's own perception regarding how much they understand the language and the culture peculiar to e-learning environments and how well they can express themselves in these kind of environments.

Above defined concepts have been examined in the literature great many times especially in the scope of readiness to e-learning or online learning. In a model developed to measure students' readiness to e-learning, Akaslan and Law (2011b) covered the component of competency of technology, which is alike ICT usage self-efficacy. Likewise, Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, and Marczyński (2011) encompassed a similar component in their model. Similarly, there are many other models pertaining to readiness to e-learning incorporating alike components in the literature (Hung et al., 2010; Mercado, 2008; Tubaishat and Lansari, 2011; Watkins, Leigh and Triner, 2004). On the other hand, there also appears to be a substantial body of research in which models concerning readiness to e-learning including online communication self-efficacy component or a similar one were proposed (Dray et al., 2011; Hung et al.; Watkins, Leigh and Triner, 2004).

Within the scope of present study, it was aimed to study prospective teachers' ICT usage and online communication self-efficacy levels with reference to some demographic variables such as gender, department, and grade level. Thus, it was determined how much prospective teachers trust themselves in both ICT usage and online communication. In this manner, it was ascertained with the combination of these two concepts how much ready they are for e-learning as teachers of the future even though readiness to e-learning is not limited to these two concepts, yet had to be limited due to space restrictions obligated in current study.

2. Method

2.1. Sampling and population

The sample of the study consisted of 1693 volunteer prospective teachers enrolled in any program at Faculty of Education of Hacettepe University, whereas the population of the study was Faculty of Education of Hacettepe University. The data were gathered during spring term of 2013-2014 academic year. Convenient sampling method was employed. The distribution, mean, and standard deviation of sample with regard to some demographic variables are illustrated in Table 2.

2.2. Data collection tool

In order to collect data, two scales were utilized in current study. First scale used to measure the construct of ICT usage self-efficacy is comprised of twelve items, while second scale used to measure the construct of online communication self-efficacy is comprised of five items. The sample items are given in Table 1.

Table 1. Sample items from the measurement tools

ICT usage self-efficacy
1) I can easily use windows operating systems
2) I can easily use office programs (word, excel, and power point)
3) I can easily use web browsers (Internet Explorer, Google Chrome etc)
4) I can easily reach the information I seek for on the internet
Online communication self-efficacy
1) I can easily express myself in written communication (emotions, jokes etc)
2) I can easily pose questions in online discussion environments

After the scales were administered to participants, the obtained data were analyzed based on structural equation modeling. In order to determine fit between empirical and hypothesized model, four goodness-of-fit indices, which are NFI, NNFI, CFI, and lastly IFI, were reported for supporting the factorial validity of the scales. The values of these are respectively as follows: .96, .95, .96, .96. On the other hand, Cronbach Alpha reliability coefficients of ICT usage and online communication self-efficacy scales were respectively found as .89 and .85. These values are satisfactory in accordance with the recommendation of Nunnally and Bernstein (1994), Schermelleh-Engel and Moosbrugger (2003). The standardized solution screen of the measurement tool is provided in Figure 1.

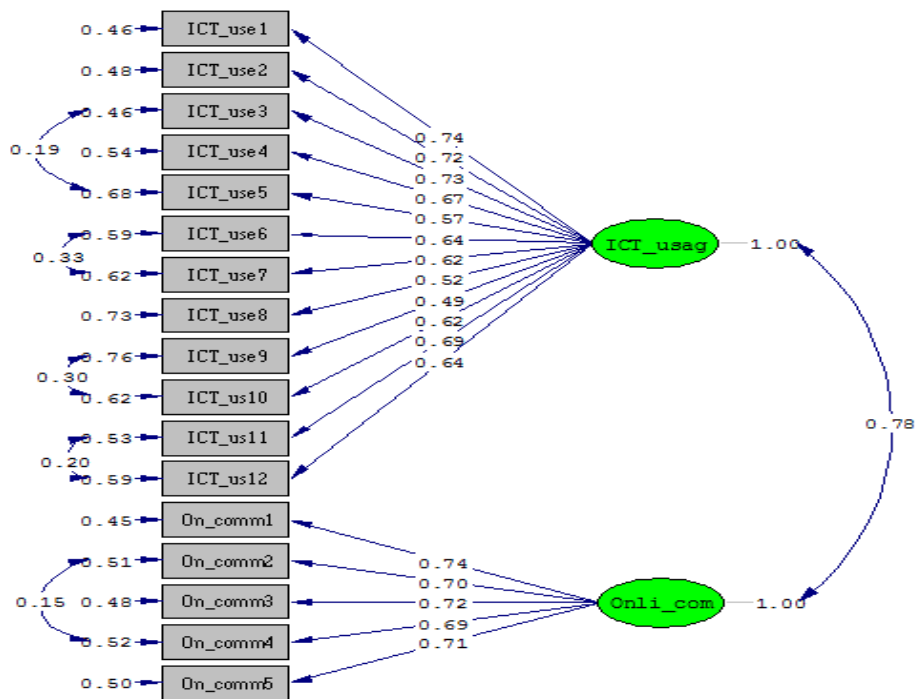


Figure 1. Construct validity of the measurement tools (Standardized Solution Screen)

2.3. Process

First, a project application was made to Scientific Research Projects Coordination Unit of Hacettepe University. Subsequently, required ethical permission from Hacettepe University Ethics Commission and administrative permission from the deanship of Faculty of Education were obtained. After that, an optical form was prepared to facilitate the data collection process. Moreover, a ball point pen and a lead pencil were given to participants as present.

2.4. Analysis

In this study, with the aim of determining differences in prospective teachers' ICT usage and online communication self-efficacy levels, overall scale scores and descriptive statistics were respectively obtained and the differences with reference to independent variables were examined. For a detailed descriptive statistics of the sample, please see Table 2.

Table 2. The distribution, mean, and standard deviation of sample with regard to gender, grade level, and department

Demographic variable	Frequency	ICT Usage Self-efficacy		Online Communication Self-efficacy	
		Mean	Std. Dev.	Mean	Std. Dev.
<i>Gender</i>					
Male	336	5.93	.86	5.98	1.03
Female	1322	5.58	.89	5.59	1.18
<i>Grade level</i>					
Freshman	407	5.45	1.02	5.54	1.09
Sophomore	416	5.66	.84	5.76	.75
Junior	343	5.76	.84	5.65	1.17
Senior	493	5.71	.85	5.71	1.14
<i>Department</i>					
German Language Teaching	93	6.02	.83	6.21	.94
Com. Edu. and Ins. Tec.*	147	6.30	.71	6.14	.91
Biology Education	44	5.64	.93	5.81	1.32
Science Education	197	5.73	.81	5.66	1.08
Physics Education	29	5.99	.90	6.01	1.09
French Language Teaching	58	5.74	.93	6.00	1.06
Prim. Math. Education**	128	5.44	.80	5.27	1.02
English Language Teaching	192	5.73	.92	6.05	1.03
Chemistry Education	56	5.74	.83	5.95	.96
Mathematics Education	110	5.40	.82	5.59	1.13
Preschool Education	115	5.46	.93	5.40	1.17
Psyc. Coun. and Guidance ***	208	5.29	.84	5.37	1.24
Classroom Teaching	227	5.51	.94	5.28	1.31

* Computer Education and Instructional Technologies

** Primary Mathematics Education

*** Psychological Counseling and Guidance

In this study, means obtained with respect to levels of independent variables were aimed to be compared in terms of a linear model such as ANOVA. However, such linear models are based on a number of assumptions, the most important of which is the normal distribution of data set. That is why, first, Kolmogorov-Smirnov test was performed to check if data is normally distributed. Since the data show a non-uniform distribution, Kruskal-Wallis Test instead of ANOVA was performed to determine as to whether there is a statistically significant difference or not. Significance level was set as .05.

3. Finding

In this part, findings regarding prospective teachers' ICT usage and online communication self-efficacy levels were reported.

3.1. Findings regarding prospective teachers' ICT usage self-efficacy levels

In this part, findings concerning prospective teachers' ICT usage self-efficacy levels were adverted (See. Table 3).

Table 3. Demographic findings regarding prospective teachers' ICT usage self-efficacy levels

Demographic variable	Chi-Square	Asymp. Sig
Gender	46.70	.000
Grade level	20.94	.000
Department	184.78	.000

As it is illustrated above in Table 3, there was concluded to be a significant difference between female and male prospective teachers in ICT usage self-efficacy levels ($p=.000, \chi^2=46.70$). The difference is in the favor of male ones. When it comes to the finding about grade level, it was revealed that there is also statistically significant difference among grade levels ($p=.000, \chi^2=20.94$). Prospective teachers' ICT usage self-efficacy levels are noted to rise steadily until senior year where it diminishes a little. Lastly, like two prior variables it was seen there is statistically significant difference in the prospective teachers' ICT usage self-efficacy levels with reference to department in which they are enrolled ($p=.000, \chi^2=184.78$). It was concluded that the department of Computer Education and Instructional Technologies (CEIT) has the highest score, while the department of Psychological Counseling and Guidance has the lowest.

3.2. Findings regarding prospective teachers' online communication self-efficacy levels

In this part, findings regarding online communication self-efficacy levels were touched upon (See. Table 4).

Table 4. Demographic findings regarding prospective teachers' online communication self-efficacy levels

Demographic variable	Chi-Square	Asymp. Sig
Gender	33.03	.000
Grade level	7.01	.072
Department	141.64	.000

First, as shown in Table 4 there was found to be a statistically significant difference pertaining to prospective teachers' online communication self-efficacy levels with regard to gender ($p=.000, \chi^2=33.03$). Male prospective teachers are noted to have much greater online learning self-efficacy levels than female ones do. As far as prospective teachers' grade levels are concerned, in contrast to gender, statistically non-significant difference was obtained ($p=.072, \chi^2=7.01$). Finally, with regard to prospective teachers' departments it was concluded there was a significant difference at the level of .05 ($p=.000, \chi^2=141.64$). It was revealed that prospective teachers of language education departments (English, French, and German) and the department of CEIT have a great deal higher online communication self-efficacy levels than prospective teachers of other departments do.

3.3. The relationship between prospective teachers' ICT usage and online communication self-efficacy levels

Together with other aforementioned finding, it was also revealed that there is statistically significant positive strong relationship between prospective teacher' ICT usage and online communication self-efficacy levels ($r=.78$)

4. Discussion

In this part, findings regarding prospective teacher' ICT usage and online communication self-efficacy levels were discussed in term of some demographic variables, which are gender, grade level, and department.

4.1. Discussion regarding prospective teachers' ICT usage self-efficacy levels

In the present study, a statistically significant difference was found in terms of gender in the ICT usage self-efficacy construct. More specifically, males were found to have greater ICT usage self-efficacy levels than female

counterparts did. In a study conducted with university students Hung et al. (2010), on the contrary, found that there is no significant difference with respect to gender in the factor of computer/internet self-efficacy. Likewise, in Bunz, Curry and Voon's (2007) study there is no gender difference in computer competency component. Unlike two above studies, Moftakhari (2013) revealed that the use of technology readiness of males is higher than that of females. Conversely, Shen, Cho, Tsai, and Marra (2013) revealed that female students have greater self-efficacies to handle tools in a Content Management System (CMS). As exemplified above, there is no strong agreement in the literature as to whether there is an impact of gender on prospective teachers' ICT usage self-efficacy levels.

When it comes to discussion of grade level with respect to prospective teachers' ICT usage self-efficacy levels, it was concluded that there are statistically significant difference. The difference is in the favor of more experienced students. This finding is contrary to that of Hung et al. (2010) where no difference exists. In a study carried out with prospective teachers Akkoyunlu and Kurbanoglu (2003), on the other hand, found that the prospective teachers' computer self-efficacy perception levels boost as grade level promotes. As seen, in the literature it is not clear whether grade level affects prospective teachers' ICT usage self-efficacy levels or not.

As far as prospective teachers' ICT usage self-efficacy levels in terms of department are concerned, it was revealed that there is a statistically significant difference. As expected, the department of CEIT has the highest score. Akkoyunlu and Kurbanoglu (2003) were seen to reach a congruent result in a study. They found that students of CEIT had higher computer self-efficacy levels compared to those students from other departments. Additionally, Moftakhari (2013) concluded that university students' use of technology readiness levels vary depending on their departments with English Linguistics, Turkish Folklore, and Information management having the highest scores while Philosophy, and French Language and Literature having the lowest ones. To sum up, there is an evident consensus that department influences university students' ICT usage self-efficacy levels. Expectedly, CEIT students have greater ICT usage self-efficacy levels than students of other departments do in that there are many courses teaching how to utilize ICT technologies in the curriculum of the department of CEIT.

4.2. Discussion regarding prospective teachers' online communication self-efficacy levels

As it is in ICT usage self-efficacy construct, researchers concluded that prospective teachers' online communication self-efficacy levels vary with respect to gender. Furthermore, the results of present study show that males possess greater online communication self-efficacy levels compared to females. This finding is inconsistent with that of Hung et al. (2010). On the other hand, Caspi, Chajuta, and Saportaa (2008) revealed that women prefer written communication more than men do. Similarly, Shen et al. (2013) came to the conclusion that female students have higher self-efficacy levels to interact with both instructors and classmates for academic purposes. In contrast to the findings of Caspi et al (2008) and Shen et al (2013), the finding of Bernard, Brauer, Abrami, and Surkes (2004) is seen to be consistent with that of Hung et al (2010). In conclusion, in the literature there appear to be a number of contradicting findings pertaining to prospective teachers' online communication self-efficacy levels with respect to gender; therefore, it is rather hard to draw a precise conclusion about it.

The only non-significant difference attained within current research is that there is no statistically significant difference in the prospective teachers' online communication self-efficacy levels with reference to grade level. On the contrary, in a study carried out by Hung et al. (2010) whose related finding is not in line with present one, junior and senior college students exhibit significantly greater readiness in online communication self-efficacy construct than freshman and sophomore ones do. Since there being no adequate research pertaining to the previously mentioned construct, to conclude something precise and meaningful is quite hard. On the other hand, it was found that there is a statistically significant difference in the prospective teachers' online communication self-efficacy levels according to department in which those students are enrolled. The difference was expectedly in favor of language education departments (English, French, and German) and CEIT inasmuch as language education departments by their nature deal with language, which is a communication tool in essence. As far as CEIT is concerned, within present study "online" communication self-efficacy construct was examined instead of just verbal, written or other communication ways or patterns, which do not entail ICT usage skills or competency, so given that CEIT students take great many courses and consequently get accustomed to those online tools and doing things in online way much more than students of other departments do. Nonetheless, there seems to be no study in the literature neither supporting nor disapproving this finding.

4.3. Discussion regarding the relationship between prospective teachers' ICT usage and online communication self-efficacy levels

The findings of the current study suggest that there is statistically significant positive strong relationship between prospective teachers' ICT usage and online communication self-efficacy levels. In contrast, Hung et al. (2010)

reported that there is almost no relationship between mentioned constructs. On the contrary, Yurdugül and Alsancak-Sarıkaya (2013) indicated that there is strong relationship between above-mentioned constructs.

As it might be inferred from the findings above, it is vague as to whether there exists a statistically significant relationship between above-mentioned constructs. Some findings of current study are different from those of some other ones cited in this study and this situation may stem from the fact that the sample of some studies is comprised of university students while that of current study is exclusively comprised of prospective teachers.

5. Implications

There appears to be very few studies regarding prospective teachers' ICT usage and online communication self-efficacy levels and the consequences of these studies seem to be contradictory; therefore, more study should be conducted in order to obtain results that are more consistent. Besides, more courses related to integration of technology into education could be added to curriculum of all departments in order that students will have higher levels of ICT usage self-efficacy and become better at communication via online tools.

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