Student teachers’ perceptions about the impact of internet usage on their learning and jobs

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\textbf{ABSTRACT}

This study investigated student teachers’ perceptions about the impact of internet usage on their learning and future jobs. The sample consisted of 448 student teachers from the Early Childhood and Primary Education Departments at the National University of Athens, in Greece. Student teachers’ perceptions regarding the impact of internet usage on their learning and future jobs were, in general, positive. Most of the students believe that internet use in university study makes learning more interesting and effective, and that possessing internet skills will assist their future job prospects. This study has shown that the more the years of digital experience and the higher the frequency of internet usage, the more positive were students’ perceptions regarding internet’s impact on their learning and future jobs. More years of digital experience resulted in less perceived complexity. Implications of the findings for teacher training education programmes are also discussed.

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1. Introduction

The internet is broadly used in the university educational area (Judd & Kennedy, 2010) and student teachers now have more opportunities to learn and work (Yang & Tsai, 2008). Learners’ perceptions/beliefs of the internet have been identified as important factors that affect learners’ motivation, interest and performance in internet-based learning environments (Peng, Tsai, & Wu, 2006). Pre-service teachers are expected to possess positive perceptions towards the usage of computer and the internet (Birgin, Çoker, & Çatlioglu, 2010; Chai & Lim, 2011; Wong & Hanafi, 2007). As universities promote internet usage, there is a need to understand university students’ experiences and perceptions about it (Frank, Reich, & Humphreys, 2003). There have been some studies which examined university or college students’ perceptions of the role of the internet on their learning, on academic success or on work prospects (e.g., Cheung & Huang, 2005; Tella, 2007; Yang & Lin, 2010; Yang & Tsai, 2008).

Cheung and Huang (2005, p. 248) had a sample of 328 university students and concluded that “Internet usage was found to correlate significantly with students’ perceptions of learning and job prospects”. For general learning, internet use in university study was helpful in terms of enhancing students’ motivation to learn, increasing their verbal communication skills and stimulating thought. The authors proposed a research framework in order to assess internet usage in university education and (taking into account their research model) they concluded that internet usage may have a positive impact on students’ learning and job prospects in practice.

A survey analysis of 434 undergraduates at the university of Botswana (Tella, 2007) found a significant difference between the greater number of respondents who agreed with the statement that the internet improved their academic performance, in relation to the respondents who disagreed with that proposition/statement.

Matthews and Schrum (2003) studied 364 students’ perceptions of the importance of internet access in their university dormitories. They found a weak but positive correlation between students’ perceptions that academic performance was the result of a student’s own effort and (a) the quantity of time spent on the internet, as well as (b) the perception that the internet was a useful academic tool.
In Jones’ (2002) study, 79% of the several thousand students surveyed stated that the internet had a positive impact on their college academic experience. Yang and Tsai (2008) investigated 500 university students’ preferences and beliefs about learning in the web-based context and found that students held a rather contextual belief about web-based learning (correlated to their environmental preferences). Johnson (2008) related the cognitive performance of students to the frequency of internet usage. She found that those college students who were frequent internet users demonstrated better visual reasoning.

The purpose of this study was to investigate student teachers’ perceptions regarding the impact of internet usage on their learning and future jobs. More specifically, students’ perceptions about the impact of internet usage on their learning regards an investigation of students’ perceptions/views/beliefs on whether internet usage in university study helps them improve their general learning and whether it makes learning more interesting (involving aspects of enhancement of students’ learning performance, learning skills and motivation). Students’ perceptions about the impact of internet usage on their future jobs, regards an investigation of students’ perceptions of the effect of internet usage on their future job prospects (involving aspects of internet skills helping them in the job market, assisting job performance and increasing the opportunity to gain job security).

2. Objectives of the study

The research objectives were:

1. To investigate student teachers’ perceptions regarding the impact of internet usage on their learning and future jobs.
2. To confirm the factorial structure of the questionnaire and the relationships between factors regarding students’ perceptions.
3. To investigate possible impact of exogenous variables (gender, year of study, internet related variables) on students’ perceptions.

3. Methodology

3.1. Sample

The subjects were 448 student teachers attending a B.Ed degree in two pedagogic departments (Early Childhood Education and Primary Education) at the National University of Athens, in Greece. 91.7% were female. This high percentage is consistent worldwide with the predominance of females in the population of early childhood and primary school teachers (Chen & Chang, 2006). Among the 448 participants, 56.5% were in the 1st year, 14.5% were in the 2nd year, 13.4% in the 3rd year and 15.6% in the 4th year or above. 98% had access to a computer at home, most of them with internet access. Table 1 displays the demographic characteristics of the sample regarding the years of computer and internet use, as well as the frequency of internet use.

3.2. Research instrument and procedure

Data were collected by the use of a questionnaire that consisted of two sections. Via the first section of the questionnaire, we collected information regarding students’ demographic characteristics (gender, year of studies, age), access to a computer at home, connection to the internet at home, years of experience with computers and the internet, as well as frequency of internet use. Regarding frequency of internet use, we used a five point scale (never, around one hour per month, around one hour per week, several hours per week, more than one hour per day) which was used in earlier research (e.g., Preston, Cox, & Cox, 2000). As mentioned above, the results are shown in Table 1.

The second section of the questionnaire included 34 statements/items (S1–S34), used in order to investigate student teachers’ perceptions regarding the impact of internet usage on their learning and future job prospects. The statements were taken from Cheung and Huang (2005) and they were slightly modified for the purpose of this study. The items of the questionnaire which we used correspond to ten validated constructs of previous relevant research (see Cheung & Huang, 2005), namely: “internet skills” (experience using the internet), “perceived enjoyment” (represents an intrinsic motivation for use of the internet in university study), “internet usage” (frequency and intensity of internet usage, use of a variety of applications/tools, use for a variety of tasks), “perceived complexity of using the internet” (extent of difficulty in using the internet itself), “perceived usefulness”, “impact on general learning” (includes aspects of normal learning skills, motivators, learning tools and creative thinking), “impact on collaborative learning” (includes enhancement of verbal communication and interpersonal skills in collaborative learning), “impact on distance learning”, “impact on future jobs” (measures perceptions of the effect of internet usage in university study on future job prospects) and “social pressure” (refers to an individual’s perceptions of normatively

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Percentages of students regarding the years of computer and internet use, as well as the frequency of internet use (n = 448).</td>
</tr>
<tr>
<td></td>
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<tr>
<td>---</td>
</tr>
<tr>
<td>&gt;5 years</td>
</tr>
<tr>
<td>3–5 years</td>
</tr>
<tr>
<td>1–2 years</td>
</tr>
<tr>
<td>&lt;1 year or never</td>
</tr>
<tr>
<td>Frequency of internet use</td>
</tr>
<tr>
<td>More than one hour per day</td>
</tr>
<tr>
<td>Several hours per week</td>
</tr>
<tr>
<td>Around one hour per week</td>
</tr>
<tr>
<td>Around one hour per month or never</td>
</tr>
</tbody>
</table>
appropriate behaviour with regard to the use of the internet in university study). The modifications made for the purpose of this study were that we used the above mentioned ten validated constructs, leaving out those that were not relevant to our students. For example, we did not include in our questionnaire the “internet support” construct because of the practically absence of technical support to our university students. Thus, the survey was modified in order to be applicable to our sample: the original survey had business studies students, while we had early childhood and primary education student teachers. In the questionnaire administered to our students, the statements were presented in mixed order and the negatively worded items were recoded in order the highest values in the scale to correspond to positive views. Students were asked to rate their perceptions on a 5-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = I am not sure, 4 = agree, 5 = strongly agree).

The questionnaire was administered at the beginning of the Easter semester of the academic year 2009–2010, prior to starting the introductory to ICT (Information and Communications Technology) university modules. Two of the authors were the tutors in the relevant modules. Students’ responses were anonymous, they were assured that there was not right or wrong answer and their responses were not going to be related to any assessment.

3.3. Analysis of results

All model tests were conducted on the appropriate covariance matrices using as Structural Equation Modelling software Mplus 6.11 (Muthén & Muthén, 1998–2010). The statistical software SPSS 19.0 was also used in data management and various descriptive analyses.

4. Results

4.1. Confirmatory factor analysis

In the subsequent analysis we recoded the categories “strongly disagree” and “disagree” into one category because of the first category’s small size of counts (<2%). As the best option for CFA modelling with categorical data (Brown, 2006), the robust weighted least square estimator, WLSMV (Muthén & Muthén, 1998–2010) was used to test the goodness-of-fit of the hypothesized structure of the questionnaire to the observed intercorrelations among 19 items. Table 2 shows students’ response rates on the 19 statements.

The Confirmatory factor analysis was used to evaluate the four factor model, assuming zero values of the correlations between the error terms. On the “perceived complexity” (extent of difficulty in using the internet itself) factor load three items (S10, S11, S12), on the “impact on future jobs” factor load six items (S32, S31, S30, S28, S27, S33), on the “internet usage” factor load four items (S7, S9, S1, S6) and on the “impact on learning” factor loads the last group of six items (S29, S3, S17, S4, S23, S20). Each group of items loads exclusively on the corresponding factor. Three of the four goodness-of-fit indices (see Table 3) demonstrated acceptable fit: TLI > 0.95 (Hu & Bentler, 1999), $\chi^2$/df < 3 (Carminges & Mclever, 1981) and RMSEA < 0.08 (Browne & Cudek, 1993). Table 4 shows CFA factor loadings as well as covariances and correlations between factors. All factor loadings were found statistically significant ($p < 0.05$) with values greater than 0.45.

Raykov’s (2001) CFA-based method was used to estimate the scale’s reliability. This approach was expressed by the equation $\rho = (\sum \lambda_i^2)/[(\sum \lambda_i^2 + \theta_0)]$, where $(\sum \lambda_i^2)$ is the squared sum of unstandardized factor loadings, and $\theta_0$ is the sum of unstandardized loadings, $\theta_0$ is the sum of unstandardized loadings.
measurement error variances. This equation was adapted by setting \( \lambda_i = p_i \), the completely standard factor loadings (Table 4), and \( \theta_i = 1 - (p_i)^2 \). The reliability coefficients 0.88, 0.84, 0.81 and 0.78 for “perceived complexity”, “impact on future jobs”, “internet usage” and “impact on learning” respectively, are indicating acceptable internal consistency.

Furthermore, in order to investigate concurrent and discriminate validity attributed to the confirmed factors, we used two conceptually relevant (criterion) variables: the observed variable “frequency of internet use” and the variable “years of digital experience”. On the later, two observed indicators load highly: “years of experience with computers” (0.82) and “years of experience with internet” (0.98). Estimated correlations between the two above mentioned variables and the four factors confirmed by CFA (Table 5), show an acceptable validity. Indeed, the high correlation coefficients (0.8) revealed between “internet usage” and “frequency of internet use” was expected, as well as the low correlations between “frequency of internet use” and the remaining latent constructs shown in Table 5.

4.2. Structural model

The next step was to estimate a Structural model with directional paths between the four latent constructs found in the Measurement model and some demographic (gender, year of study) or internet related (access to a computer at home, access to internet at home, “years of digital experience”) variables. In the Structural model, the five observed variables mentioned above were allowed to correlate as exogenous. However, paths relating “gender”, “access to a computer at home”, “access to internet at home” and “year of study” with the endogenous latent variables were not statistically significant. In the last step of our exploration, these exogenous variables were eliminated to create a second Saturated Structural model with the exogenous latent variable “years of digital experience” and four endogenous latent constructs in the following hierarchical order: “internet usage”, “perceived complexity”, “impact on learning” and “impact on future jobs”. The Saturated model fits the data reasonably well (see Table 3). Lastly, a “Pruned” model was tested after eliminating no significant paths of the previous Saturated model. The Pruned model demonstrated again an acceptable and better fit (Table 3). In comparison to the Saturated model, the Pruned model represented the data in a more parsimonious manner with no fit degradation (\( \Delta \chi^2 = 5.82, \Delta df = 5, p = 0.324 \)). Completely standardized direct relationships between pairs of exogenous variables and latent constructs, as well as between pairs of latent constructs are presented in Fig. 1. Dashed arrows represent the statistically non-significant paths (i.e., the paths which were non significant

### Table 3

<table>
<thead>
<tr>
<th>Goodness of fit indices</th>
<th>CFA model</th>
<th>Saturated structural model</th>
<th>Pruned structural model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>190.298</td>
<td>209.275</td>
<td>179.196</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>69</td>
<td>77</td>
<td>71</td>
</tr>
<tr>
<td>( \chi^2 ) / df</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CFI</td>
<td>0.933</td>
<td>0.943</td>
<td>0.953</td>
</tr>
<tr>
<td>TLI</td>
<td>0.954</td>
<td>0.961</td>
<td>0.966</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.063</td>
<td>0.062</td>
<td>0.058</td>
</tr>
</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>Latent indicator pair</th>
<th>Variable pair</th>
<th>Regression (stand.) weight</th>
<th>S.E.</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perceived complexity</td>
<td>–</td>
<td>–</td>
<td>0.19 (0.31)</td>
</tr>
<tr>
<td></td>
<td>Impact on future jobs</td>
<td>–</td>
<td>–</td>
<td>0.14 (0.35)</td>
</tr>
<tr>
<td></td>
<td>Impact on learning</td>
<td>–</td>
<td>–</td>
<td>0.23 (0.53)</td>
</tr>
</tbody>
</table>

### Table 4 (continued)

<table>
<thead>
<tr>
<th>Latent construct pair</th>
<th>Variable pair</th>
<th>Covariance (Correlation)</th>
<th>S.E.</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Internet usage</td>
<td>–</td>
<td>–</td>
<td>0.27 (0.68)</td>
</tr>
</tbody>
</table>
The amount of variance in each of the endogenous latent constructs accounted for by their upstream latent predictors was significant. Predictors account for more than 20% of variance in all latent structures: the “impact on future jobs” was better predicted (46% of its variance). In general, the impact of predictors on the predicted latent constructs was similar to those estimated for the Saturated model. In the last Pruned model there was only one statistically significant direct effect on each latent construct. “Internet usage” explains a significant part of “impact on learning”. This means that the more frequent internet usage results in significantly higher students’ perceptions about internet’s impact on learning process. “Years of digital experience” had a positive indirect effect through “internet usage”. The longer the usage, the higher the level of perceived impact on learning. “Impact on learning” account for a 46% of variance in students’ perceptions regarding internet impact on their future jobs. Not surprisingly, a significant part of “perceived complexity” variability is explained by “years of digital experience”: the more the years of digital experience, the less the perceived complexity.

5. Discussion and conclusions

There is an emerging body of evidence about university students’ internet use and internet perceptions, based primarily on students’ self-reported behaviour. This study contributes to this evidence by investigating student teachers’ perceptions about the impact of internet usage on their general learning and future job prospects.

The majority of the sample (63%) had more than three years of experience in using the internet, while for 84% of the sample the frequency of using it ranged between several hours per week and more than an hour daily. For several students this experience was acquired before they entered university, as half of the sample attended their first year of studies.

With regard to the first objective, student teachers’ perceptions regarding the impact of internet usage on their learning and future jobs were, in general, positive. Regarding students’ perceptions about the impact of internet usage on their learning (see Table 2), over half of the sample either “agree” or “strongly agree” with 4 out of the 6 statements of the factor “impact on learning”. In particular, 80% believe that “internet makes learning more interesting” (S03), 65% that “the use of the internet helps improve my learning” (S17), 56% that “the use of the internet will increase the opportunity for more meaningful work” (S29) and 50% that “working/studying with internet is fun” (S04). Also, regarding students’ perceptions about the impact of internet usage on their future jobs (Table 2), over 55% of the sample either “agree” or “strongly agree” with 5 out of the 6 statements of the factor “impact on future jobs”. In particular, 85% agree with the statement “I will be in advantage in the job market with my internet skills” (S33), 79% believe that “use of the internet will increase the scope of variety in my job” (S27), while 74% agree with each of the statements “internet skills will help me in the job market” and “overall, the use of the internet will assist my job performance” (S32 and S31 respectively).

With regard to the second objective, the confirmatory factor analysis revealed a four factor model for the questionnaire, with high reliability coefficients and acceptable concurrent and discriminate validity.

![Pruned Structural model of students' perceptions](image)

**Table 5**

Correlations between the two criterion-variables and the four factors.

<table>
<thead>
<tr>
<th></th>
<th>“Frequency of internet use”</th>
<th>“Years of digital experience”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet usage</td>
<td>0.80*</td>
<td>0.52*</td>
</tr>
<tr>
<td>Perceived complexity</td>
<td>-0.10</td>
<td>-0.45*</td>
</tr>
<tr>
<td>Impact on learning</td>
<td>0.34*</td>
<td>0.28*</td>
</tr>
<tr>
<td>Impact on future jobs</td>
<td>0.15*</td>
<td>0.16*</td>
</tr>
</tbody>
</table>

*p < 0.05.
With regard to the third objective, as shown in Fig. 1, the higher frequency of internet usage results in more positive students’ perceptions regarding the impact of internet on their learning and future job prospects. The exogenous variable “years of digital experience” (involves internet usage) was found to be significantly correlated to “internet usage”, “perceived complexity”, “impact on learning” and “impact on future jobs”. The first two correlations revealed were expected: the “years of digital experience” was positively linked to “internet usage” and negatively linked to “perceived complexity” (see Table 5 and Fig. 1). This means, the more the years of digital experience the less complex students perceive the use of the internet. The other correlations mean, the more the years of digital experience the higher the level of perceived impact on learning and future jobs. Our results are in agreement with earlier research which showed that internet usage had a positive impact on students’ perceptions of general learning and job prospects (Cheung & Huang, 2005) and on their academic performance/learning (Jones, 2002; Tella, 2007).

There is some agreement between the factors identified/revealed in this study with the factors proposed by Cheung and Huang (2005) (whose questionnaire, was slightly modified and used in this study). The “perceived complexity” factor – extent of difficulty in using the internet itself – (statements S10, S11 and S12) was identified exactly as the factor proposed in Cheung & Huang’s (2005) study. Also, three (out of the four) statements that were found to load on the “internet usage” factor (i.e., S7, S9, S6) and all statements that load on the “impact on future jobs” factor, were exactly as in Cheung & Huang’s (2005) study. The above could be interpreted as some sort of agreement across cultures and across time: university students seem to hold similar perceptions across different countries and time (provided our studies are being separated by a period of six years).

As discussed earlier, we created/constructed the variable “years of digital experience” from the variables “years of experience with computers” and “years of experience with internet”. We then applied this new variable for the purpose of our analysis. The “years of digital experience” was the only statistically correlated variable to students’ perceptions regarding the use of the internet. The other exogenous variables (gender, access to a computer at home, access to internet at home, year of study) did not have any statistically significant impact on students’ perceptions.

This study has shown that the more the years of digital experience and the higher the frequency of internet usage, the more positive were students’ perceptions about internet’s impact on their learning and future jobs. Literature has shown that when teachers believe technology uses are valuable, they are more likely to incorporate those uses into their practices (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010) and that teachers’ skills – beliefs may encourage or hinder their use of technology in the classroom (Hew & Brush, 2007). Teachers have increasingly more opportunities to utilize the information technology to enhance their learning: for example they need to learn from the internet to advance their knowledge and professional development (Carlson & Gadio, 2002; Kao & Tsai, 2009). Our findings have implications for teacher training education programmes (and further on for teacher professional development). Our university’s pedagogic departments need to further equip student teachers with adequate knowledge and skills so as to utilize the internet and information technology as effective tools in their future practices in classrooms. Teacher training courses could emphasize the potential positive impact of internet use on student learning and how new (emerging) technologies support their learning practices. We propose, for pre-service teacher education programmes to take into account students’ needs and to provide opportunities for student teachers to examine their perceptions about the integration of technology into the learning process.

A limitation of this study was that the questionnaire used did not discriminate among different internet applications or learning activities (e.g., Web 1.0, Web 2.0 technologies, communicating, information seeking/sharing) and that over half of the sample attended the first year of their studies. Future research is suggested to distinguish among different learning–teaching activities and internet technologies. Taken into account that university students’ use of technology varies over time (Judd & Kennedy, 2010), it is interesting to investigate student teachers’ different uses of the internet as well as whether (and how) their perceptions change over time. We would also propose the use of the questionnaire for university students in other cultures in order to investigate possible differences and similarities among different countries.

References


