

PEDAGOGY

Greek Undergraduate Physical Education Students' Basic Computer Skills

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Abstract

The purposes of this study were to determine how undergraduate physical education (PE) students feel about their level of competence concerning basic computer skills and to examine possible differences between groups (gender, specialization, high school graduation type, and high school direction). Although many students and educators believe technology will help them and make them more efficient in their educational tasks, the majority do not feel well prepared to integrate technology into their professional learning, research, and future teaching. The sample consisted of 313 final-year undergraduate students: fourth-year PE students (168 male, 145 female) of the Faculty of Physical Education and Sport Science of Athens University. The students responded to the Basic Computer Skills Survey created by the International Society of Technology in Education. The findings of the present research demonstrated PE students do not feel their basic computer skills are sufficient. The rate of fluency was increased only in relation to the high school courses they had chosen, confirming in part the effect of secondary education in learning basic computer skills.

Over the last two decades, Information and Communications Technology (ICT) use in education has spread rapidly, especially the Personal Computer (PC). As would be expected, the proliferation

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of PCs has affected the ICT and has become important to teachers and educators in general. There is, therefore, an urgent need to educate future teachers properly so they can exploit and develop the huge potential of new technologies, particularly computers, which constitute the main part of ICT. It includes the use of computers (desktop, laptop, and palmtop), video recording equipment, projectors, interactive presentation boards, audio systems, and computer productivity software programs such as word processing, electronic presentation programs, spreadsheets, databases, and grading programs, as well as technology that is specific to physical education (Woods, Karp, Miao, & Perlman, 2008).

Physical education (PE) teachers can use a range of software to make their daily work more efficient. According to the British Educational Communications and Technology Agency (BECTA, 2004), word processors can be used to create lesson plans, documents on the bulletin board, rules of conduct and administration policy, letters to parents, and worksheets and to record and evaluate the students. Also, spreadsheets can be used to record and store grades, export grade results, register sports equipment, and record the participation of students, and databases can be used to record personal data and information about the students. Finally, presentation software programs (Microsoft PowerPoint, Hyperstudio, etc.) can be used to design and develop multimedia lesson plans and multimedia projects from the students (Mohnsen, Chestnutt, & Burke, 1997).

Several studies conducted in the last 20 years have concluded that teachers, both senior and younger ones, do not have the necessary knowledge in ICT, especially in the use of PCs (Askar & Umay, 2001; Rovai & Childress, 2002). Even today, although the United Nations Educational, Scientific, and Cultural Organization (2002) stated educational systems around the world are under mounting pressure to use ICT to teach students the basic knowledge and skills needed in the 21st century, few programs exist worldwide that adequately prepare students and future teachers to exploit the opportunities PCs offer. Consequently, the majority of teachers lack proficiency in the use of PCs (Liang, Walls, Hicks, Clayton, & Yang, 2006; Panagiotakopoulos, Alexopoulos, Goutsos, Skaltsas, & Tasios, 2005; Tsitouridou & Vryzas, 2003). The facts show ICTs are not a basic element of the preparation of future teachers in the majority of universities, and another major problem is that despite student teachers knowing how to handle a PC for their personal use,

they cannot integrate this knowledge into their science and teaching (Judge & O'Bannon, 2008; Rowand, 2000).

The National Association for Sport and Physical Education (NASPE, 2006) stated PE teachers should demonstrate knowledge of current technologies and their application in PE. They also should design, develop, and implement student learning activities that integrate information technology, and finally, they should use technologies to communicate, network, locate resources, and enhance continuing professional development.

The research of the level of students and future teachers of PE on basic PC skills is crucial and will illuminate an important aspect of their capacities to meet current and future business requirements. Basic PC skills refers to the basic knowledge required in the use of computers and consists of word processing, use of spreadsheets, Internet services, databases, presentations, and management of files. ICT consists of all technical means used to handle information and aid communication, including computer and network hardware as well as necessary software. But are PE students well prepared to use new technologies, especially PCs, and to integrate them in the teaching environment?

Studies Concerning Students and Teachers in General

Kalogiannakis and Papadakis (2007) studied the attitude toward ICT of 40 students of the ASPETE institution (ASPETE = School of Pedagogical and Technological Education), in Heraklion, Crete. The results showed the students considered themselves to be well educated (high self-sufficiency) in ICT. Specifically, they considered themselves well trained in the sections related to creating presentations, managing files, and searching the Internet and moderately trained in the sections related to word processing and spreadsheets.

In a longitudinal study conducted at the Democritus University of Thrace, Department of Electronics and Computer Engineering (Karakos, 2005), which was related to computer programming, 576 first-year students participated, and it was found the majority of the students possessed negative attitudes toward computer programming. These attitudes became positive only after some time of involvement with this specific object of programming.

In a Singapore study (Teo, 2008) involving 139 preservice teachers, of whom 84 were female, the participants had the lowest score, among other factors, on the factor of perceived control and

management of a PC (3.54 out of 5). The results suggested the participants were more positive about their affect toward computers and intention to use computer than their perceptions of the usefulness of the computer and their control of the computer. But even in this category, the participants had scores above the average of the 5-point rating scale. Moreover, this study found no significant differences between prospective teachers of different age and gender. A similar survey was conducted in two Asian countries by Teo, Su Luan, and Sing (2008). They tried to compare prospective teachers from Singapore and Malaysia in the assimilation of new technologies in education. A total of 250 students participated (175 female, 75 male) with a mean age of 24 in Singapore and 245 students (183 female, 62 male) from Malaysia with a mean age of 23.4. Among other results, the students of both countries considered themselves familiar with the handling of a PC ($M = 3.69$ and $M = 3.81$, respectively, on a 5-point Likert-type scale).

In a study of Mutton, Mills, and McNicholl (2006), conducted in 24 high schools with the participation of 51 teachers, 66% of these teachers answered they felt confident with the use of ICT and PCs in general, 20% felt partially confident, and only 14% did not feel able to use them. But this rate decreased significantly when the teachers were asked about their ability to use these skills in teaching (43% adequate, 29% partially adequate, 28% not adequate).

Askar and Umay (2001), in their Turkish research involving 155 mathematics teachers, found that the teachers had little confidence about their efficiency to handle PCs, despite that they had positive attitudes toward their use and the perspective of teaching with their aid. Finally, Judge and O'Bannon (2008) conducted a research of 34 full-time faculty members (seven instructors, 12 assistant professors, seven associate professors, and eight full professors), at the University of Tennessee, Knoxville, of which 27 were female and seven male. They concluded that all members of the scientific staff widely used the ICT for personal purposes, especially in the design and preparation of teaching, in the assessment of learning and checking the papers of their students. But on the other hand, they did not use ICT in the classroom during teaching.

Studies Concerning PE Students and Teachers

Liang et al. (2006) conducted a survey of 145 college PE degree students from two universities in the Midwestern region of the United States and found that 4.1% of the students considered

themselves unable to use a PC, 38.7% just adequate in the use of a PC, 45.5% familiar with computers, and only 11.7% fluent with the basic PC skills. Essentially, students did not consider themselves technologically well prepared to be able to teach successfully in the digital age.

Woods et al. (2008) studied 114 PE teachers (38 male, 75 female, one unreported) who were members in the Northwest District Association of the American Association of Health, Physical Education, Recreation, and Dance (NWD). Among PE teachers, 32.28% had worked as a teacher for 1 to 5 years, 28.25% for 6 to 15 years, 25.22% for 16 to 24 years, and 28.25% for over 25 years. The results showed a large percentage of these teachers (> 80%) rated themselves as *competent* or *very competent* with the basic PC skills, but a significant difference was found between gender; men overestimated their abilities in comparison to women. No statistically significant difference was found between teachers with different working experience.

In a Greek survey (Chatziparasidis, Antoniou, Gourgoulis, & Bebetos, 2008) consisting of 355 PE teachers, 169 female and 186 male, the authors concluded these teachers considered themselves familiar with the computer's use ($M = 3.13$ on a 5-point Likert-type scale, with 5 being *very similar*). However, although a significant percentage of these teachers thought the new technologies are a necessary tool to improve the quality of education provided, a small percentage claimed they use them in the preparation of a lesson and an even smaller percentage during the teaching practice. Most PE teachers use them for personal purposes, communication, entertainment, and finding information on the Internet.

In the Greek prefecture of Dodecanese, Loukipoudi and Sofos (2010) studied the technological abilities and computer knowledge PE teachers possess, as well as the integration of computer technology in the preparation of the lesson and in the teaching process, using questionnaires measured on a 5-point Likert-type scale. Seventy-eight PE teachers took part in this study, of whom 51.3% were male and 48.7% female. Half of these teachers (50%) worked in primary education and the other half in secondary education. The results showed they have a moderate knowledge on PCs and ICT in general. They believed they had a better knowledge on Word (3.56 out of 5) and Internet use for retrieving information (3.90) and communication (e-mail; 3.51), especially to communicate with their colleagues and supervisors (66.7%). Another important result was

60.3% of the PE teachers use modern technologies for planning and preparing their course, but only 35.9% use them during the lesson and the teaching process.

In Buckenmeyer and Freitas' (2005) study at two high schools in the Midwestern United States, involving 144 teachers, of whom four were physical educators, the teachers agreed their level of knowledge concerning basic PC skills is low. They also believed the need is urgent to be educated in the new technologies and learn how to use them in practice. Furthermore, they believed the use of PC and technology will make them more efficient and will help them better educate their students.

From the literature review, it seems that until today the research that has been done on the basic skills of undergraduate students, both globally and in Greece, is limited. The purpose of this study was to investigate what the undergraduate students of the Faculty of Physical Education and Sport Science, in Athens, Greece, believe about their level of competence concerning basic PC skills. We were also interested in the examination of possible differences between student groups (gender, specialization, high school graduation type, and high school direction).

Method

Participants

The participants were 313 PE final-year undergraduate students (fourth year) of the Faculty of Physical Education and Sport Science of Athens University, of whom 168 were male and 145 female, between ages 21 and 45 ($M = 23.03$, $SD = 2.76$). The students attended 26 specializations in the Faculty (Table 1). The students who attended Sport Management, Health Science, Olympic Studies, and Adapted Physical Activity specializations were placed in the "theoretical" specializations ($n = 74$), and the others were segmented in the "practical" specializations ($n = 239$).

Instrumentation

The participants in this survey completed the Basic Computer Skills Questionnaire, which was developed by the International Society of Technology and Education (ISTE) in the United States. It was part of the outcomes of the National Educational Technology Standards (NETS) Project. The questionnaire was translated into Greek by three experts of the English language, with knowledge

Table 1*Number of Students per Specialization*

Specialization	Male	Female	Total	Specialization	Male	Female	Total
Sport Management	4	2	6	Fencing	2	6	8
Tennis	12	16	28	Olympic Studies	11	15	26
Track and Field	8	7	15	Modern Dance	4	14	18
Greek Dance	4	17	21	Volleyball	4	9	13
Gymnastics	2	11	13	Football	27	2	29
Health Science	15	4	19	Adapted Physical Activity	10	13	23
Water Ski	2	2	4	Boxing	3	1	4
Equestrian	2	6	8	Throwing	5	1	6
Sailing	5	3	8	Synchronized Swimming	0	2	2
Basketball	13	0	13	Taekwondo	3	2	5
Canoe / Kayak	0	3	3	Water Polo	4	0	4
Swimming	12	8	20	Handball	3	0	3
Rowing	2	0	2	Skiing	11	1	12

on the specific subject matter. The three translations were unified and the new adapted questionnaire was created. It consisted of 29 questions, and each question was rated on a 4-point Likert-type scale (1 = *unable*, 2 = *adequate*, 3 = *familiar*, 4 = *fluent*). The total sum of the responses could range from 29 to 116. The total possible range was divided into four categories: 29 to 50 was defined as *unable*, 51 to 72 was defined as *adequate*, 73 to 94 was defined as *familiar*, and 95 to 116 was defined as *fluent*. By selecting one of the four possible choices, participants stated their estimated knowledge level about each of the technology-related indicators.

Pilot Study

The adapted version of the Basic Computer Skills Questionnaire was administered to 17 students (age, $M = 19.88$, $SD = 1.11$) to check whether the translated questionnaire was accurate and comprehensible. No misapprehensions were observed, and all students stated they could comprehend easily all 29 statements.

To validate the reliability and stability of the questionnaire over time, the test–retest reliability method was used and the Pearson correlation coefficient was calculated. The instrument was administered twice to 47 students (age $M = 22.17$, $SD = 2.41$), of whom 20 were male and 27 female, at the beginning and at the end of a 2-week period. The correlation of the two measurements provided a high Pearson correlation coefficient ($r = .95$).

Procedure

For the administration of the questionnaires, the researchers informed the students who would participate in the survey to ensure their permission for the research to take place. Then the researchers informed the students of the conditions under which the survey would be conducted and its purposes, and there was an assurance about the absolute anonymity of their responses. The time of completion of the questionnaire was 10 to 15 min. The researcher was present throughout the administration of the questionnaires for possible clarifications in the process. The research took place inside the university campus. The survey was administered at the beginning of each lecture. It was indicated to the students their answers were strictly confidential and the questionnaires would be used for the study of PC knowledge use only. The period of administration of the questionnaires was at the end of the academic year, between May and June.

Data Analysis

Data analyses were conducted using SPSS 17.0. The reliability for the Basic Computer Skills Questionnaire was assessed using Cronbach's alpha coefficient. Methods of descriptive statistics were used for the description of the examined variables according to the gender and the age of the participants. To examine the possible differences between different groups (gender, specialization, type of high school graduation, and high school direction) and to control the main assumptions of the research, inductive statistics (t test, ANOVA, Z-test) were applied.

Results

The Cronbach's alpha coefficient for the Basic Computer Skills Questionnaire was .95. The results of the descriptive statistics show that across all participants ($N = 313$) the basic computer skills overall mean for the self-reported indicators was 75.02 and standard deviation was 18.55. The range was 87, from 29 to 116 out of 116 possible points (Table 2).

Table 2

Basic Computer Skills Overall

Points	Scale	<i>n</i>	%	Cumulative %
29–50	Unable	30	9.58	9.58
51–72	Adequate	112	35.78	45.36
73–94	Familiar	118	37.7	83.06
95–116	Fluent	53	16.94	100
Total		313	100	

Across all male participants ($n = 168$) the basic computer skills overall mean for the self-reported indicators was 74.71 and standard deviation was 19.74. The range was 87, from 29 to 116. The female participants ($n = 145$) had on average 75.38, with a standard deviation of 17.13. The range was 82, from 31 to 113 (Table 3).

Across all participants who had graduated from general high schools ($n = 300$), the basic computer skills overall mean was 74.98 and standard deviation was 19.36. The range was 85, from 29 to 114. The participants who had graduated from all the other high school types ($n = 13$) had on average 76, with a standard deviation of 23.21. The range was 74, from 42 to 116 (Table 4).

Table 3*Basic Computer Skills Male–Female*

Points	Scale	Male <i>n</i>	Female <i>n</i>	Male %	Female %
29–50	Unable	18	12	10.72	8.28
51–72	Adequate	60	52	35.72	35.86
73–94	Familiar	59	59	35.12	40.69
95–116	Fluent	31	22	18.44	15.17
Total		168	145	100	100

Table 4*Basic Computer Skills General (GHS)–Other High School Type*

Points	Scale	GHS <i>n</i>	Others <i>n</i>	GHS %	Others %
29–50	Unable	28	2	9.33	15.38
51–72	Adequate	108	4	36	30.77
73–94	Familiar	114	4	38	30.77
95–116	Fluent	50	3	16.67	23.08
Total		300	13	100	100

Across all participants who had graduated from social high school direction ($n = 134$), the basic computer skills overall mean was 72.33, with a standard deviation of 16.59. The range was 82, from 29 to 111. The participants who had graduated from technological high school direction ($n = 138$) had on average 76.6, with a standard deviation of 18.92. The range was 82, from 32 to 114. The participants who had graduated from hard sciences high school direction ($n = 28$) had on average 79.68, with a standard deviation of 22.2. The range was 78, from 33 to 111 (Table 5).

Across all participants who had selected theoretical specializations ($n = 74$), the basic computer skills overall mean was 71.28, with a standard deviation of 18.67. The range was 82, from 29 to 111. The participants who had selected practical specializations ($n = 239$) had an average of 76.18, with a standard deviation of 18.39. The range was 85, from 31 to 116 (Table 6).

The results of the *t* tests and the one-way ANOVA, which were used to compare the self-estimation of the basic PC skills level among different groups are listed in Table 7. Statistically significant

Table 5*Basic Computer Skills Social–Technological (Tech.)–Hard Sciences (H.S.) High School Direction*

Points	Social <i>n</i>	Tech. <i>n</i>	H.S. <i>n</i>	Social %	Tech. %	H.S. %
29–50	12	13	3	8.96	9.42	10.72
51–72	57	44	7	42.54	31.88	25
73–94	54	52	8	40.3	37.68	28.57
95–116	11	29	10	8.2	21.02	35.71
Total	134	138	28	100	100	100

Table 6*Basic Computer Skills Theoretical–Practical Specializations*

Points	Scale	Theoretical <i>n</i>	Practical <i>n</i>	Theoretical %	Practical %
29–50	Unable	10	20	13.51	8.37
51–72	Adequate	28	84	37.84	35.15
73–94	Familiar	27	91	36.49	38.07
95–116	Fluent	9	44	12.16	18.41
Total		74	239	100	100

Table 7*Basic Computer Skills T Test and ANOVA Summary Table*

Groups	<i>df</i>	<i>t</i> or <i>F</i>	<i>p</i>
Gender	311	-.316	.752
Specialization	311	-1.994	.047*
High school graduation	311	-.194	.846
High school direction	299	2.887	.057

difference was found between the two specializations (theoretical and practical) of the last year in the Faculty.

The results of the Z-tests, which were used to compare the proportions from two independent groups to determine whether they are significantly different from one another, are listed in Table 8.

There were found statistically significant differences in the “fluent” category (95–116) between the social and technological high school directions and between the social and hard sciences high school directions (Figure 1). In both comparisons, the students

Table 8

Basic Computer Skills Z-Test Summary Table

	Gender	High School	High School Direction			Specialization
	Male–Female	GHS–Other	Social–Tech.	Tech.–H.S.	Social–H.S.	Theoretical–Practical
Unable	0.536	0.244	-0.079	-0.140	-0.068	1.087
Adequate	-0.091	0.090	1.694	0.495	1.514	0.283
Familiar	0.897	0.234	0.319	0.699	0.948	0.109
Fluent	0.620	0.226	2.809*	1.428	3.631**	1.075

* $p < .01$, ** $p < .001$

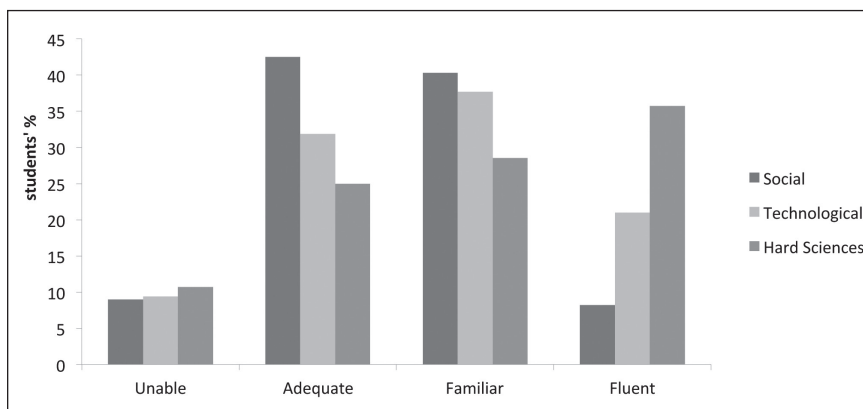


Figure 1. Grouped Chart of High School Direction

who had graduated from social high school courses lacked basic PC skills.

Discussion

The findings demonstrated the fourth-year PE students who participated in this study felt they were partially trained on the basic PC skills, which are consistent with the results of Loukipoudi and Sofos (2010). The Teacher Development Agency (TDA, 2007) surveys in the United Kingdom showed new teachers rate their preparation in the ICT use less positively than other aspects of teaching. Only 16.94% of the students reported themselves to be fluent overall on their basic PC skills, and 45.36% of the students considered themselves unable or inadequate in PC use. The results

can be explained: In the undergraduate program of studies of the Faculty of Physical Education and Sport Science of Athens, there is only one noncompulsory course of basic PC skills learning. As a result, few students attend it and acquire new or additional knowledge regarding PC handling. Most of the students who have the basic skills have obtained them in the past because of their personal involvement with PCs, through frequent use of e-mail and social networking sites (Hammond et al., 2009), or by following private lessons outside the Faculty.

The comparison between the results of male and female students showed no significant differences in both the averages and the percentages of the four categories (Tables 3 and 7). These findings are consistent with those of Teo (2008) and Panagiotakopoulos et al. (2005), but differ from the results of other studies (Margolis & Fisher, 2002; Markauskaite, 2006; Woods et al., 2008), most likely because the samples used in their research were different than this one. In earlier studies, women were found to have a negative attitude toward computers (Cambell, 1990), and it was considered the manly nature of computers was to blame for this (Culley, 1988). Therefore, women had the same opportunities to use the computers, but the female students tended to use them less than male students (Muir, 1987). In the present study, the lack of differences between males and females may be because in modern Greece women, having won “equal” position in society and education as men, take advantage of the same opportunities they are given in ICT, and thus they do not lack basic PC skills. Females also have developed their self-efficacy and feel more confident nowadays in the ICT competence, probably due to regular access to ICT, through the extensive personal ownership of a PC or laptop.

When comparing the PC competency level of students who had graduated from general high schools to those from other high schools (technical, sport, musical, etc.), no statistically significant difference was found. This is because students do not transfer a significant part of the knowledge obtained in high school after their graduation at the university (Kester, 1994) and because students by the end of their studies tend to forget the knowledge acquired on various computer programs (Brown & Kester, 1993).

In the Greek educational system, the secondary education students have to choose, follow, and study in one of the three different high school directions (social, technological, and hard

sciences), when entering the last 2 years of their studies. The students' means, when comparing basic PC skills obtained in high school by following different directions, were slightly different but not statistically significant. However, the graduates of technological and hard sciences directions have a slight superiority in knowledge of basic PC skills. When the results were divided into four categories and the results were grouped, there was a statistically significant difference in the fluent category (95–116) between the social and technological high school directions and between the social and hard sciences high school directions. In both comparisons, the students who had graduated from social high school courses lacked basic PC skills. Moreover, graduates from the hard sciences direction had the highest aggregate in the top two categories (familiar and fluent) with 64.28%. It seems reasonable that the graduates of social directions had lower scores because in the last 2 years of high school, they enroll in only social courses (i.e., history, ancient Greek language, and Latin language) and their undergraduate training focuses on specific learning areas. Their professors also hardly ever use ICT and PC in the classroom, so these students do not have powerful and convincing examples of ICT use in subject teaching (Barton & Haydn, 2006), as the role models to whom they are exposed within the high school subject matter lack these skills. Nevertheless, it was expected the technological direction graduates would have scored better than the graduates of the hard sciences direction because the former follow a specific course on computer programming in their last year in high school and the latter do not. A possible explanation for this result would be that basic PC skills depend not only on the knowledge gained in high school, but also on the different learning and knowledge background of the students, as well as on the developed confidence to perform specific PC and ICT tasks. In Greece, the students who follow the hard sciences direction are usually the ones who are considered the most talented, have the highest grades, and want to pursue a career in socially rewarding faculties (medicine, engineering, etc.).

The results of the comparison between the theoretical and practical specializations showed statistically significant difference between the two means (71.28 and 76.18, respectively). It is also worth observing that during the clustering of the results, the percentage of students classified as unable was 13.51% for those of the theoretical specializations and only 8.37% for students of practical specialization. These results were reversed for the proportion of

those who were fluent, and the percentage of students of theoretical specializations was 12.16% and of practical specializations was 18.41%. This possibly happens because the percentage of students of practical specializations who have graduated from technological and hard sciences high school directions is greater than the opposite number of the practical specializations (57.32% and 39.19%, respectively, in total, 10.46% and 4.05%, respectively, from hard sciences direction). Another possible explanation is the professors in theoretical specializations do not widely use ICT and PCs in the subject teaching. As a result, students do not consider them mentors and role models in PC use, which is, according to Hammond et al. (2009), an important aspect in modeling the use of ICT and raising their awareness of different types of use.

Conclusion

The present research demonstrated the final-year PE students are partly trained in basic PC skills and still need improvement to use them fluently. These basic skills do not seem to depend significantly on gender and type of high school graduation. Relative to the high school directions, it seems those who attended hard sciences and technological directions were more fluent in handling a PC. Finally, the students who attended practical specializations in their last year of studies had better knowledge in using a PC than the students of theoretical specializations.

PE teachers may not use directly these skills in the teaching procedure, but they certainly will need them for other purposes (organizing lessons, student evaluations, administrative support, general personal use). Also, if they do not have these basic PC skills, they are highly unlikely to be able to handle more complex software and integrate it into the teaching procedure. In addition, international standards on ICT and PC knowledge are increasing day by day (BECTA, 2008; ISTE, 2008; NASPE, 2006), and rapid advances in technology are putting new demands on both educators and students (Cuckle, Clarke, & Jenkins, 2000; Mutton et al., 2006). For example, ISTE (2008) suggested teachers should

exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations. Model and facilitate effective use of current and emerging

digital tools to locate, analyze, evaluate, and use information resources to support research and learning. (p. 1)

Furthermore, future PE teachers, after graduation and while entering the labor market, need to adapt to the highly growing demands of the employers who, nowadays, seek employees who have at least basic PC skills (Davis, 1997). In our research, the majority of the fourth-year PE students in Athens, Greece, failed to keep up with these standards and expectations, as they do not feel capable of fluently using basic PC skills.

Physical Education Teacher Education programs need to provide this knowledge to graduates so they can broaden their personal PC skills, as the use of technology in the teaching of PE was found to be highly correlated to the knowledge, training, and prime education PE teachers have (Loukipoudi & Sofos, 2010). This could be done through hands-on workshops, involving group work (Barton & Haydn, 2006), or structured reflection on the use of ICT and PCs (Selwood & Pilkington, 2005). Furthermore, it would be useful to introduce in the undergraduate curriculum courses regarding new technologies in the PE field, such as health and fitness hardware and software.

Learning basic PC skills and using new technologies is not an end in itself in PE. It can only be a useful tool for improving the educational task and the teaching procedure. The ICT's excessive and uncontrolled use can have the opposite results, reducing physical and labor activity, which is the main subject of PE.

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