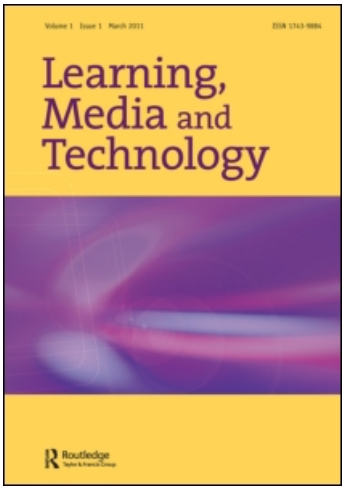

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The effect of information literacy on physical education students' perception of a course management system

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The purpose of this study was to determine the effect of information literacy on students' perception toward the educational services offered by an asynchronous course management system (e-Class) for the support of the traditional instruction method in tertiary physical education (PE) institutions. Participants were 211 PE students between the ages of 19 and 24 years, who were sorted into three groups according to their information literacy level: high, medium, and low users of technology. Data was collected using an online survey during a one-week period. One-way analyses of variances (ANOVAs) revealed significant differences between the three user groups, in each factor of the perception questionnaire: 'interaction', 'participation', 'educational material', 'usefulness,' and 'user control'. In the above factors, the high and medium user groups reported better results than the low-technology user group. In conclusion, learner familiarity with computer and online technologies made positive contributions to their perception toward course management systems. Hence, it is essential that physical education students should have basic information technology skills to feel more satisfied with their online learning experiences.

Keywords: asynchronous e-learning; tertiary education; information literacy; perception; course management system

Introduction

Course management system (CMS) is a term that is very widely used in the twenty-first century, and it has become a topic worthy of research by itself. A CMS is a software that allows teachers to manage their courses, facilitate the development of e-learning and deliver course materials for the students through a network system (Roach 2006). CMS has become a very common tool for supporting on-campus courses and distance education in tertiary

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education. With the trends of distance education, numerous CMS products were designed (EduTools 2008). According to EduTools (2008), several common features can be found among these CMS products: (1) communication tools; (2) productivity tools; (3) student involvement tools; (4) administration tools; (5) course delivery tools; and (6) curriculum design. Due to the varieties of CMS products, evaluating and investigating users' perceptions toward CMS provides more information for decision-makers to understand users' expectations and needs.

Past research (Lin 2008; McGill and Klobas 2009; Paechter, Maier, and Macher 2010; Vernadakis, Zetou et al. 2008) has indicated that tertiary education institutions at large are receptive to the adoption of e-learning technologies. According to this research, many tertiary institutions believe that the adoption of CMS technology is able to improve the quality of learning, to better equip learners with information technology skills that are useful for their professional development, to provide wider access in education to meet the demand for tertiary education, as well as to improve cost-effectiveness in the delivery of education.

Distance education and related research continues to proliferate. Research has focused on how students and faculty members experience or perceive online learning environments as meeting their expectations (Bekele and Menchaca 2008). Some researchers have focused on how different facets of students' expectations and experiences are related to perceived learning achievements and course satisfaction (Paechter, Maier, and Macher 2010), where others have studied the importance of participant interaction in online environments (Arbaugh and Fich 2007). McGill and Klobas (2009) investigated the role of task–technology fit in CMS success and addressed the question of how it influences the performance impacts of CMSs, whereas Lin (2008) looked at students' overall satisfactions in hybrid courses through objective measures of their views. Furthermore, Bolliger and Wasilik (2009) attempted to propose an e-learning evaluation model comprising a collective set of measures associated with an e-learning system.

These individual assessment frameworks yield convenient solutions in practice. However, most of these researches have focused on fields such as computer science, information systems, psychology, education, and educational technology. Furthermore, not many have tackled the question how e-learning technology and CMS influences student's perceptions in physical education (PE). This area is important because online programs might allow some students to work independently (self-paced) and may match one's learning style, combined with the flexibility of time to achieve appropriate PE learning tasks and course requirements. Moreover, in this study, e-learning appears as an online component of hybrid learning so it may need different learning attitudes and learning approaches to learn online via CMS technology.

Therefore, in the present study, the student's perceptions were examined based on their computer skills and the ability to use computers and other

elements of technology. That is, students' perceptions toward online CMS were analyzed from a sample of PE students with information literacy ranging from low to high.

Literature review

Researchers have identified a number of factors associated with students' satisfaction with distance learning and online learning, in particular. These factors include course structure (Stein 2004; Stein et al. 2005), interaction among students and between students and instructor (Bray, Aoki, and Dlugosh 2008; Kim and Moore 2005; Stein et al. 2005), and learner characteristics such as learner autonomy (Bray, Aoki, and Dlugosh 2008), information technology experience (Buzzetto-More 2008; Buzzetto-More and Sweat-Guy 2006), and distance learning experience (Arbaugh 2004).

The level of online course experience in tertiary education has been identified as a predictor of student satisfaction with learning in an online environment. Students with higher levels of online course experience reported significantly higher levels of satisfaction and enjoyment with learning (Buzzetto-More and Sweat-Guy 2006). Arbaugh (2004) found that students' perceptions of the online learning environment, including interaction with other learners, ease of use, and the usefulness of course software, changed as they participated in additional online courses. The most significant changes were noted between the first and the second online course that learners participated in. Increases in the ease of use and learners' satisfaction with the online course delivery medium were noted with subsequent online course experience, and the largest increase was seen after participants completed their first course online. These findings suggest that programs should encourage students to take more than a single online course before deciding whether online learning is right for them (Arbaugh 2004).

The literature criticizes the assumption that most students have the ability to use the information and communications technologies (ICT) within an educational setting (Jones et al. 2004) and suggests that many undergraduate students do not seem to automatically transfer their use of technology for social purposes to their learning, that they can 'make technology work, but not place these technologies in the service of (academic) work' (Katz 2005, 8). Kennedy et al. corroborated by discussing the 'technological diversity' of university students – so that 'we cannot assume that being a member of the "Net Generation" is synonymous with knowing how to employ technology based tools strategically to optimize learning experiences in university settings' (2008, 117). In fact, distance education tools might seem unfamiliar or difficult to learn for many students, so they might not be very keen to participate in online activities (Hong, Ridzuan, and Kuek 2003; Xie, Debacker, and Ferguson 2006). Hence, it is essential that students should have basic computer skills to maintain control of their own learning in distance education.

Lacking the required information technology skills can be a source of computer anxiety (Piccoli, Ahmad, and Ives 2001) and even become a barrier to learning (Cheurprakobkit, Hale, and Olson 2002). Those students must invest extra effort in learning the necessary technology skills while being expected to simultaneously master new course content. Online learning requires access and know-how.

There has been some controversy regarding the relation between the level of comfort of using online learning environments and the degree of student satisfaction with online courses. Being at ease with online learning environments may not explain satisfaction with online learning (Marks, Sibley, and Arbaugh 2005; Westbrook 1999). However, Buzzetto-More and Sweat-Guy (2006) found a significant relation between the two variables: students who felt more at ease using online learning environments were more likely to be satisfied with their online learning experiences than those students who did not feel comfortable using the online courses. It appears that in some cases, comfort with online learning may be related to satisfaction.

In a study involving 137 university students in Taiwan, Liao and Lu (2008) found that students with prior e-learning course experience had higher scores on the intention scale to use online learning environments than those without prior e-learning course experience. The differences in the perceptions–intention relationship for students with and without experience in online learning environments make an argument for the consideration of an experience component associated with the online learning environments. Another study involving 1,368 students attending European tertiary education institutions offering traditional and distance learning courses revealed three variables that might influence participants' perceptions and preferences regarding computer technology and cited that the most important of these was general information literacy (Proost, Elen, and Lowyck 1997). In contrast, Marks, Sibley and Arbaugh (2005) found that students' experience with online courses was not significant in predicting students' perceived learning in online Master of Business Administration (MBA) courses at an upper Midwestern university.

According to Bekele's model (2008), success in the online CMS learning environments functions as a complicated interplay of human, technological, course, pedagogical, and leadership factors. Human factors referred to student and instructor understandings and perceptions as well as their competencies related to the online learning environments. Technological factors were linked to the attributes of educational technology. Course factors were linked to the critical elements needed in instructional design. Pedagogical factors primarily referred to the patterns of learning and instruction in online learning environments. Finally, leadership factors denoted the role played by the administration related to technology leadership.

Within this framework existed complex relationships among the above five factors. However, since this study is part of a larger, ongoing three-year project, its focus was limited solely to the investigation of the human factor.

The human factor suggested that higher levels of ICT competency, attitude, and experience in the online learning environments would result in higher success. Student and instructor views of technology and technology's role in knowledge and learning would also influence success. For example, if participants viewed knowledge as something to be acquired and defended, they would not be as actively involved in learning. Similarly, if the role of technology in learning was limited merely to carrying information, students would be unlikely to exploit optimally the potential of technology. Thus, the purpose of this study was to examine the effect of information technology experience on students' perceptions toward the educational services offered by an asynchronous CMS in PE. This study was founded on the assumption that this examination would assist administrators, faculty, and university students to gain more knowledge about the role of CMS in tertiary PE institutions as a context for hybrid learning courses. Furthermore, we carried the assumption that the findings of this study will contribute to a better understanding of how computer experience affects the way students feel about CMS in PE, an area less well researched. The CMS chosen for the study was e-Class: a CMS widely used within Greek tertiary education institutions. The study looked into the following main research statement:

- Does the mean average of students' perceptions of the specific CMS used in the study (i.e., e-Class) differ among the three experimental populations: those with low information literacy, those with medium information literacy, and those with high information literacy?

To explore this, perceptions were explored in relation to interaction, participation, educational material, usefulness, and user control.

Method

Participants

The participants included in this study were undergraduate students enrolled in courses at the Department of Physical Education and Sport Science, Democritus University of Thrace, in the spring semester of the academic year 2007–2008; the duration of the course was from the mid of February 2008 until the end of May 2008 (13 weeks). The sampling frame used for this study was self-selected sampling. For data collection, the researchers asked five instructors, who were delivering hybrid instruction in three different subject disciplines of information technology and PE at the university, to allow students to participate in the study. Two hundred thirty-two students ($n = 232$) responded to this invitation; however, only those who were taught via the hybrid learning approach (online via e-Class CMS and face to face) were eligible for the study. As a result, 211 students participated in the data collection (Table 1). The

Table 1. Demographic characteristics.

Item	Frequency *(N)*	Percent (%)
Gender		
Male	150	71.1
Female	61	28.9
Grade		
Freshmen	76	36.1
Sophomores/Juniors	58	27.4
Seniors	77	36.5
Information literacy level		
High users	62	29.4
Medium users	70	33.2
Low users	79	37.4

students' participation was voluntary, and the anonymity of students' responses and their confidentiality as participants were explained before distributing the instruments.

Hybrid course structure

In this study, hybrid learning environments were created for three information technology and PE courses: (1) technological applications for parents and teachers; (2) new technologies in health; and (3) new technology in PE. The first two courses were concentrations and were attended primarily by students with sophomore or junior standing, while the last one was obligatory and was attended by first-year students. Attendance in the above courses was required. The 'technological applications for parents and teachers' course aimed at the acquisition of advance information technology in a variety of settings, such as home, work, school, or other environment. The 'new technologies in health' course aimed to introduce practical knowledge on the use of information technology in health and PE practice. The 'new technology in PE' course aimed at the development of ICT skills, particularly skills involved in the use of the operating system of a personal computer, office applications, and internet services. The hybrid design for the above information technology courses in PE consisted of two parallel layers that were performed together: the in-class portion focused on activity learning, and the online portion aimed at the delivery of content material organized into a series of learning modules. The hybrid courses included PowerPoint lecture notes, a glossary of key terms and definitions indexed alphabetically and by unit of study, relevant links to external websites, supplemental handouts, self-checks, quizzes, an online discussion section, and individual mailboxes.

The in-class portion of the hybrid course met once a week and was limited to a maximum of 25 students per section. Each in-class meeting included a brief lecture, no more than 10 minutes, plus 40 minutes of in-class 'active learning' activities: discussions, role-playing, debates, worksheets, group projects, and group presentations. Class activities were designed to create an environment that fostered critical thinking and the development of active learning abilities with personal reflections and action plans. The instructor served as the guide to learning and not as a disseminator of knowledge. Four exams were given, and although tests were not identical, they covered the same content material and the questions were from the instructor's test database. The online portion of the hybrid course focused on content delivery, course management and extension of the in-class discussion to the web. The online component consisted of PowerPoint presentations with a corresponding note sheet, homework assignment, and quizzes each week. Materials were presented using *Open eClass* CMS. The *Open eClass* CMS was selected to administer this study because the environment is familiar to the participants (all of the online courses investigated utilized e-Class). The virtual classroom of the e-Class courses was open from the first term of each course until the end of the spring semester. During this period, students could work in the virtual classroom at any time and from any computer with an internet connection.

Instrumentation

Course management systems

The *Open eClass* platform in version 2.1 was used to provide an alternative method of distributing information to the traditional method approach. This platform allowed the teachers to quickly organize practical online courses, contact student users registered to them, upload educational materials (texts, images, presentations, video, assignments, exercises, etc.), and create discussion forums where course participants could interact. Students on their part could have access to educational materials via the internet and participate in working groups, discussion forums, and exercises (GUnet Asynchronous eLearning Group 2008).

Users logged in the *Open eClass* platform by typing in their username and password, which allowed them to enter into their personal portfolio, an area that helped them to organize and control their eCourses participation in the platform.

On the eCourse home screen, there was a short description in which basic information (title, code, responsible teacher, department, etc.) was posted. Also, there was an 'email' hyperlink which allowed registered student-users, who had defined their email address in their profile, to communicate with the course teacher via email. On the left, there was a menu with all the active eLearning tools (modules) provided for the eCourse by the teacher in charge (see Figure 1).

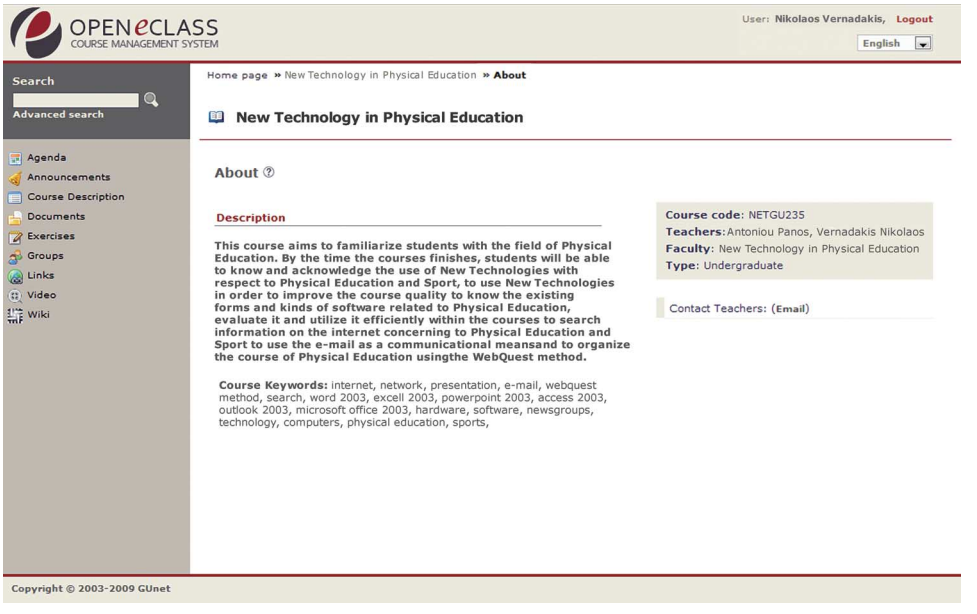

Figure 1. The eCourse home screen in the *Open eClass* platform.

Upon completion of the eCourse, students could sign out from the *Open eClass* platform by clicking on 'Exit' on the right side, at the top of the screen.

Perception instrument

The Course Management System Scale – CMSS (a = . 78) developed by Vernadaki, Antoniou et al. (2008), mainly based on discussions in the related literature (Bekele 2008; Salaway and Borreson Caruso 2008; Sun et al. 2008), was used to collect data for this research study. The survey was composed of four parts. The first part of the survey included questions related to the participants' demographic information (age, gender, etc.). The second part constituted of eight questions on the participants' prior expertise with computers and computer applications by using a five-point Likert-type scale (1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent).

In the third part, five dimensions were used to assess the students' perceptions toward online CMS. The first dimension (participation) constituted of five questions (e.g., I am willing to participate in other courses via e-Class) and measured the students' degree of engagement with the course and the e-learning process. The second dimension (educational material) included four questions (e.g., the educational material was clear and well structured) and measured students' perception concerning the structure, quality, and coherence of the course learning material. The third dimension (usefulness) included four questions (e.g., It was easy to use e-Class) and measured students' perception of the ease of adopting an e-learning system. The fourth

dimension (user control) included four questions (e.g., I could decide on my own about the pace of learning and the use of learning strategies) and measured students' perception concerning individual learning processes. The last dimension (interaction) attempted to measure students' perception of the interaction level between students and instructors by means of four items (e.g., student-to-instructor interaction was more difficult than in other courses). Under the five dimensions previously identified, participants rated their responses for each of these 21 items using a five-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree, and 5 = strongly agree).

Furthermore, the fourth part of the survey poses questions about which e-Class tools students consider helpful for them in order to be successful in PE courses by using a five-point Likert-type scale (1 = never, 2 = rarely, 3 = occasionally, 4 = often, and 5 = very often).

However, since this study is part of a larger, ongoing three-year project, only the second part of the participants' prior expertise with information technology and the third part of students' perceptions toward the e-Class CMS were used as part of the analysis.

Data collection

Data for this research was collected using an online questionnaire. The online questionnaire was designed in such a way that when participants first clicked on the link to the questionnaire, they were shown an informed consent letter explaining the purpose and structure of the questionnaire, their rights as participants, as well as any possible risk involved in participation in this research. In the letter, participants were also given the email address of the researcher in case there were other questions regarding the research that a participant wished to clarify. The email could also be used if a participant was interested in knowing the results of the research study.

Only undergraduate students who had been using the online e-Class CMS were eligible for the study. It was determined that participants would need approximately 30 minutes to complete all sections of this instrument.

Design

The design of the study was a single-factor design. The dependent variable of this particular design was the students' perception factor, consisting of the following five components: interaction, participation, educational material, usefulness, and user control as measured by the CMSS. The independent variable was the level of use of information literacy, assessed by aggregating responses to eight items from the technology skills section and splitting them according to the average response (79 'poor' users, 70 'fair' to 'good' users, and 79 'very good' to 'excellent' users).

Results

The data collected through the closed questions of the questionnaire were analyzed by using descriptive statistics. Eventual differences between the three experimental groups in the mean scores on each factor of the perception questionnaire were investigated through one-way analyses of variances (ANOVAs). All analyses were performed using the SPSS version 18 statistical package. The level of statistical significance was set at 0.05. Means and standard deviations for the low, medium, and the high information literacy group on the five perception factors are presented in Table 2, while results of each analysis are presented in the next paragraph.

One-way between-groups ANOVAs were conducted to explore the impact of prior information technology experience on each factor (interaction, participation, educational material, usefulness, and user control) of students' perception toward the educational services offered by an asynchronous CMS (e-Class), as measured by the CMSS questionnaire. Participants were divided into three groups according to their information literacy. There were statistically significant differences in perception scores for the three groups in each factor: interaction (F (2, 204) = 5.91, $p < .013$), participation (F (2, 204) = 9.97, $p < .001$), educational material (F (2, 204) = 7.23, $p < .007$), usefulness (F (2, 204) = 9.50, $p < .001$), and user control (F (2, 204) = 9.46, $p < .001$). The strength of differences in mean scores for the information literacy groups was strong. The effect size, as assessed by eta squared (η^2), was $\eta^2 = .054$ for the interaction factor, $\eta^2 = .089$ for the participation factor, $\eta^2 = .066$ for the educational material factor, $\eta^2 = .085$ for the usefulness factor, and $\eta^2 = .085$ for the user control factor.

Post-hoc comparisons using the Tukey HSD (honestly significant difference) test indicated that the mean score for low users group (M = 3.45, SD = .56) was significantly different from high users group (M = 3.84, SD = .69) on the factor 'interaction'. Medium users group (M = 3.63, SD = .64) did not differ significantly from either low or high users group. Further, on the factor

Table 2. Means, standard deviations (SD) and significance on the dependent variables for the three groups.

	Low users (N = 79)		Medium users (N = 70)		High users (N = 62)			
Factors	M	SD	M	SD	M	SD	F	p
Interaction	3.45	.56	3.63	.64	3.85	.69	5.91	.013
Participation	3.36	.69	3.68	.57	3.84	.66	9.97	.001
Educational material	3.50	.57	3.66	.54	3.87	.61	7.23	.007
Usefulness	3.67	.54	3.96	.56	4.06	.59	9.50	.001
User control	3.15	.68	3.51	.70	3.63	.64	9.46	.001

'participation', the mean score for low users group (M = 3.36, SD = .69) was significantly different from medium (M = 3.68, SD = .57) and high (M = 3.84, SD = .66) users group. On the factor 'educational material', the mean score for low users group (M = 3.50, SD = .57) was significantly different from high users group (M = 3.87, SD = .61). Medium users group (M = 3.66, SD = .54) did not differ significantly from either low or high users group. Also, on the factor 'usefulness', the mean score for low users group (M = 3.67, SD = .54) was significantly different from medium (M = 3.96, SD = .56) and high (M = 4.06, SD = .59) users group. Similar, the mean score for low users group (M = 3.15, SD = .68) was significantly different from medium (M = 3.51, SD = .70) and high (M = 3.63, SD = .64) users group on the factor 'user control'. As shown in Table 2, the high users of technology group scored significantly higher in the above five perception factors in comparison with the low users of technology group. Similarly, the medium users of technology group showed significantly superior performance on the perception questions of the 'participation', 'usefulness', and 'user control' factors in comparison with the low users of technology group.

Discussion

This study investigates the impact of information literacy on PE students' perception toward the educational services offered by an asynchronous CMS (e-Class) for the support of the traditional instruction method in tertiary PE institutions.

Analysis of the survey revealed a generally positive perception toward this particular online CMS regardless of student's prior information literacy. The high level of positive perception among participants supports the assumption that the respondents constitute a self-selected sample of the population. Apparently, those who were satisfied chose to respond to the survey, perhaps because they were comfortable with online CMS learning environments. Another possible explanation of the overall positive perception toward e-Class was due to the limited experience with CMS most students had. In other words, e-Class may be the only CMS most students were familiar with or had used.

Regardless of the reasons for the high level of expressed positive perception, further analysis of the survey indicated a significant impact of prior information technology experience on each factor (interaction, participation, educational material, usefulness, and user control) of students' perception toward the CMS, e-Class. The impact of prior experience in information technology on the interactional dimension revealed that the high users of technology appeared more sensitive, than the low users, to the interactive futures which empowered them to control the content and the flow of information and encouraged them to interact with the instructor or other learners. In the participation dimension, high and medium users of technology were more engaged in knowledge construction, sharing, and reflecting the processes of their own work than the low users

of technology. Further, in the educational material dimension, high users of technology were more satisfied with the amount, the structure, and the clarity of the information received than low users of technology. In the usefulness dimension, high and medium users of technology perceived the execution and operation of e-Class more user-friendly and the interface more intuitive than low users of technology. Also, it had helped to reduce the time students spent in figuring out minute details of operation so that they were able to focus on teaching and learning. At last, in the user control dimension, high and medium users of technology appreciated more the individual learning processes and appeared more independent in their choices regarding the time, the place, and the regulation of hybrid learning than low users of technology. This is consistent with previous studies (Buzzetto-More 2008; Buzzetto-More and Sweat-Guy 2006) in the literature which indicated that students who were comfortable with computer technology were more likely to have a positive attitude toward online learning environments. Similar findings by Papasratorn and Wangpipatwong (2006) suggested that experience with technology affects students' beliefs, expectations, and attitudes about online learning; therefore, students with low computer abilities may feel uncomfortable in an e-learning course, which may affect the expected outcomes.

Regardless of the differences in perceptions between the high, medium and low users of technology, students with low information technology experience were also quite positive about the experience with hybrid learning. Apparently, the perception ratings may be affected by a non-response bias. It could be that some students who were not satisfied with the courses chose not to participate in the study. Another consideration is that only students who completed at least one of the courses involved in the study were surveyed.

Findings and implications from the current study suggest that students' information technology experience and perceptions, such as the perceived interaction, participation, educational material, usefulness, and user control of distance education, should be considered as predictors of their satisfaction from classroom technology in PE, and ultimately for their success in online CMS learning environments. PE instructors of hybrid learning need to focus upon preparing students to use a variety of information technologies and need to be aware of the benefits of online learning. Thus, there is a need for well-designed and carefully implemented hybrid learning environments that meet the needs and expectations of students. Online CMS learning environments can be facilitated through activities that increase students' interaction and participation, emphasize the quality of the course's learning material and usefulness characteristics of online learning, and enhance individual learning processes.

Furthermore, the study revealed that some level of information technology competency was required for successful online CMS learning. Students needed to acquire basic computer and internet skills. Some level of experience with online learning environments was also perceived as important. This

finding corroborated previous studies indicating that some level of information technology proficiency, experience, or both were required for online learning success (Pituch and Lee 2006; Shih, Muñoz, and Sanchez 2006; Weaver 2008; Yan 2006). In addition, skill and experience were among the 'human factor' category of the conceptual framework underpinning this study. The implication was that low users of information technology would require more time and experience before becoming satisfied with online CMS learning environments.

Therefore, to fulfill students' expectations from online learning CMS environments, they need to be supported both technically and technologically. Universities and educators should create opportunities and devote resources to assist students in developing their computer skills and expertise needed for online learning. If necessary, at the beginning of the semester, the students who have a low level of computer proficiency should be provided with a training program to assure that they gain the computer skills required for the distance education course.

As with all investigations, this study is not without limitations. First, the data used in this study was drawn from a single institutional sample. The institution is best described as a large, public research department on physical education and sport science at Democritus University of Thrace. Thus, findings should be interpreted with caution, and generalizations may only be relevant to institutions similar in size, control status, and institutional emphasis.

Another limitation is the interpretation of the splitting variables that were used for the research analysis. The perception of how much experience a participant has had with information technology may vary substantially for a different group of learners. The variables were measured in relatively broad self-assessment questions in the sign-up form, and as such, the participants used their own criteria to quantify their experience. For example, they could have thought of the number of years they have worked with computers, their proficiency with standard office applications, or their internet experience. As the evaluation was carried out with undergraduate PE students, it stands to reason to assume that their average experience with information technology and the CMS was lower than that of students of a computer-related department. Therefore, the differentiation between high and low experience or interest may be considerably different for students of other disciplines.

Conclusion

As online CMS become more ubiquitous at the university level, student confidence in the medium may become somewhat less significant when gauging satisfaction with the online learning experience. For now, however, this study suggests that students' prior information technology experience is still an important factor in their positive perception toward online CMS learning environments.

Moreover, despite the fact there is a wide variety of information technology experiences (e.g., experience of computer maintenance, experience of using computer network systems and office automation software, experience of using multimedia applications and graphics programs, experience of using communications systems and internet programs, experience of using online library resources and CMS, etc.), little is known about the unique contributions of each type of information technology experience to students' perceptions regarding e-learning CMS systems. Although researchers have demonstrated how one type of information technology experience reflects on students' view, little is known about whether one type of information technology experience is more important than another. Thus, studies comparing the effects of different types of information technology experience are needed.

Notes on contributors

Nikolaos Vernadakis is a lecturer in the Department of Physical Education and Sport Science at Democritus University of Thrace. His research interests include the use, integration, and evaluation of information and communication technologies and e-learning, and the impact of technologies on organizational change. Two of his current areas of interest focus on the evaluation of students' experiences and perceptions of technologies and how learning design can help in creating more engaging learning activities. He worked as a project manager of education through internet as part of the organizing committee for the Olympic Games in Athens 2004.

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