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Comparing hybrid learning with traditional approaches on learning the Microsoft Office Power Point 2003 program in tertiary education

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ABSTRACT

The purpose of this study was to determine the effectiveness of a hybrid learning approach to deliver a computer science course concerning the Microsoft office PowerPoint 2003 program in comparison to delivering the same course content in the form of traditional lectures. A hundred and seventy-two first year university students were randomly assigned into two teaching method groups: traditional lecture instruction (TLI) and hybrid lecture instruction (HLI). Each group received six 95-min periods of instruction divided into 4 sections: a) 5-min brief outline of the key learning points, b) 40-min lecture on general knowledge c) 45-min constructivist-inspired learning activities and d) 5-min summary on key learning points. In the beginning and the end of this study students completed a 17-item multiple choice knowledge test. Two-way analysis of variances (ANOVA), with repeated measures on the last factor, were conducted to determine effect of method groups (TLI, HLI) and measures (pre-test, post-test) on knowledge test. The measures main effect was significant, as well as the groups x measures interaction effect. Two independent-samples *t* test were conducted to follow up the significant interaction. Differences in mean ratings of knowledge performance between the two teaching groups were not significantly different at first measure, while the TLI method group yielded a significantly lower mean rating at second measure. The findings indicated that HLI approach might be a superior option for undergraduate students on learning the Microsoft office PowerPoint 2003 program.

1. Introduction

Until recently, one of the big questions in distance education was whether it delivered comparable outcomes to traditional classroom instruction (Ali & Elfessi, 2004; Brown & Liedholm, 2002; McLaren, 2004; Russell, 1999; Schulman & Sims, 1999) Now, the question generating research and discussion is why not have the best of both worlds? In an effort to address this question, a new course delivery style known as the hybrid or blended course evolved that combined the best features of online learning and traditional classroom learning (Dziuban, Hartman, & Moskal, 2004; Graham, 2005; Martyn, 2003; Reasons, 2004).

Hybrid learning course model, essentially comprises classroom face-to-face interaction and online computer-mediated communication (Mitchell & Honore, 2007). The hybrid face-to-face interaction and computer-mediated communication teaching and learning come in different terms. According to Smith and Kurthen (2007), these terms include “web-enhanced”, “hybrid” and “fully online” teaching and learning. Web-enhanced courses are usually face-to-face interaction based, with only course outlines and course announcements being uploaded for the students to have online access to. Hybrid courses have significant e-learning activities, including online quizzes and synchronous or asynchronous discussions, in addition to traditional classroom face-to-face teaching and learning. Fully online courses usually refer to distance education through online media. The Sloan Consortium (Allen & Seaman, 2006) further classified web-based learning environments by the proportion of content and activities delivered online: (1) web facilitated courses (1–29%); (2) blended/hybrid courses (30–79%), and (3) online courses (80+%).

Although the hybrid delivery style is starting to be seen as a viable solution to the problems of online and traditional classes, initial feedback is still cautious, yet primarily positive (Reasons, 2004). Studies have shown that most online learners do prefer some face-to-face contact with instructors and tend to be more successful when this occurs, thus supporting the hybrid course model (Riffell & Sibley, 2005).

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Initial research also seems to indicate that student success rates in hybrid courses was equivalent or slightly superior to traditional courses, and that the hybrid courses had lower dropout rates than do fully online courses (Young, 2002).

Despite the positive feedback, there is still concern that the hybrid course option may not be the solution to distance education problems. Student confusion about the combined online and traditional delivery styles, increased student workload in hybrid sections, and weak online components are all concerns being raised (Reasons, 2004). Still, the hybrid course model is quickly gaining popularity among institutions with a large number of wholly online courses, including the Department of Physical Education & Sport Sciences at Democritus University of Thrace (DPESS-DUTh).

Moreover, e-learning technology developed around the hybrid paradigm is beneficial for improving the quality of learning, but is useless if it is not based on pedagogical prescriptions (Papastergiou, 2007). Pedagogical principles are theories that govern good educational practice. Both Thurmond (2002) and Oliver (2001) stated that the use of learning theories could contribute to the quality of hybrid courses by providing a framework for the development and implementation of appropriate teaching–learning activities. Woo and Reeves (2007) identified three main learning theories; behaviorism, cognitivism, and constructivism. Behaviorist learning theory focuses on observable behavior (objectivity) while cognitivism has a focal point on unobservable behavior (subjectivity). Constructivism emphasizes the construction of new knowledge by the learner, as well as a focus on active learner-centered experiences (Young & Maxwell, 2007). Presently, the educational environment is changed from teacher-centered to student-centered. Constructivism is a learning theory that could prove useful for designing and developing a hybrid learning program based on active learner-centered experiences (Low, 2007).

Therefore, this study focuses on differences between the hybrid learning approach and traditional learning approach in the knowledge acquisition of Microsoft office PowerPoint 2003 program. Constructivist design was applied in these approaches to help students develop constructive learning habits. In the hybrid learning approach 67% of content and activities delivered online computer-mediated communication and 33% of content and activities delivered through classroom face-to-face interaction.

2. Review of literature

2.1. Constructivism theory in hybrid learning

Today with the emergence of the hybrid learning environments, educational delivery has moved from just online instruction towards a blend of online and face-to-face approaches. Hybrid learning goes beyond barriers of time, location, and culture and has created more and better opportunities for learners and instructors. Due to these advantages many institutions and universities moved from online to hybrid learning programs and this is a fast tendancy (Gómez and Igado, 2008). Research shows that this combination has the potential of promoting learner-centered, active and constructive learning (Dori & Belcher, 2005; O'Donnell, Hmelo-Silver, & Erkens, 2006; Salomon & Ben-Zvi, 2006; Stahl, 2006). The pedagogical framework that enhances hybrid learning's advantages is constructivism.

Constructivism is a theoretical foundation that supports a transformation from teacher-centered to a learner-centered (Young & Maxwell, 2007). Constructivism theory, influenced by the work of Piaget and Vygotsky (Woo & Reeves, 2007), encourages learners to build their own body of knowledge based on individual experience and to apply this knowledge directly to their environment. In constructivism, the individual is at the center of the social process, with the focus on learning rather than on teaching (Ali, Hodson-Carlton, & Ryan, 2004). The theory states that: there are multiple ways of understanding knowledge; reality is created by an individual; and, knowledge comes from a personal interpretation of interactions with the world.

The structure of the learning environment, based on constructivism, is to promote opportunities that encourage and support the building of understanding. The constructivist's perspective indicates that the educator plays the role of facilitator, while the learner's role is one of the constructing realities through interactions with the environment (Hiemstra, 2007). Constructivism directs students to: be active in the learning environment; develop social and interpersonal skills; enjoy learning; have an understanding of the content being taught; and learn to think in an efficient manner (Low, 2007). Knowing how to think enhances students' decision-making with real-world issues, and facilitates the development of social and interpersonal skills.

Regarding the effects of constructivism theory in the hybrid learning environment, it is indicated that successful students in an online course generally used constructive learning strategies and the effect on students' knowledge construction was statistically significant (Yukselturk & Bulut, 2007). Knabe (2004) suggested that hybrid learning environments, coupled with constructivist design, are the key to developing successful courses for the next generation of students. Gerber, Grund, and Grote (2008) claimed that students could better understand the key concepts and construct their own knowledge when classroom lectures were combined with online discussion activities. In the same context, hybrid instruction was beneficial to students because it takes both instructivist and constructivist approaches in its design and the process (Delialioglu & Yildirim, 2007). Therefore, it was believed that in the hybrid learning environment deploying a constructivist instructional method, students' knowledge acquisition would be higher than those taught without a constructivist instructional method.

2.2. Prior study in hybrid learning

Distance learning is often defined as "any learning setting where faculty and students are physically separated" (Martyn, 2003). The hybrid, or blended course, is designed to keep the online course's flexibility while retaining the traditional course's face-to-face interaction, often a crucial element to student success (Brooks, 2003). The hybrid course's purpose is to "end the divide between Traditional and Online instruction by blending approaches to better meet students' needs" by ending the vacuum of fully online offerings (Laws, Howell, & Lindsay, 2003). In addition to the student benefits, the hybrid model is designed to enhance learning by better meeting specific course needs (Voos, 2003).

According to Rovai and Jordan (2004) hybrid learning is "a flexible approach to course design that supports the blending of different times and places for learning, offering some of the conveniences of fully online courses without the complete loss of face-to-face contact. The result is potentially a more robust educational experience than either traditional or fully online learning can offer". The big benefit is the idea that "learning is a continuous process," not a solitary event that occurs a few times a week in a classroom. By using multiple delivery

modes the "hybrid online model employs the best characteristics of online education and the interactivity that typically characterizes face-to-face classroom instruction" (Martyn, 2003). In addition to improving the learning experience for students and instructors, the hybrid course reestablishes the sentiment echoed in many institutions' mission statements, which emphasize the idea of "quality education with a personal touch" (Martyn, 2003).

A number of educational institutions have already implemented the hybrid learning model, and much of the data from these experiences show changes on student learning performance. For example, Singh and Reed (2001) cite studies at the University of Tennessee and Stanford University which suggest improved learning outcomes when hybrid learning was used. They report that "Organizations are rapidly discovering that hybrid learning is not only more time and cost effective, but provides a more natural way to learn and work." Graham, Allen, and Ure (2005) add, "Introducing online instructional components opens the range of instructional strategies that can be used" in a setting that has been primarily face-to-face.

Another case occurred at Florida Central University (FCU). The university's research has found that hybrid courses have the potential to increase student learning outcomes while lowering attrition rates. FCU has been gathering research data on student success and student retention in hybrid courses compared to fully online courses for the past seven years, and the improved student success and lower student retention has remained consistent (FCU, 2005). A study by Thompson Learning revealed that students taught in a hybrid learning environment composed of online and traditional instruction performed tasks with 30 percent more accuracy and 41 percent faster than the online-only group (Martyn, 2003).

Zubas, Heiss, and Pedersen (2006), confirmed the benefit of a self-paced computer tutorial on test score results. In an upper division clinical nutrition course, students who completed the self-paced tutorial in addition to traditional classroom lecture, improved test scores (on a pre/post-test) significantly more than the group receiving traditional lecture only. This demonstrates that traditional lectures supplemented with computer-based tutorials improved diabetes knowledge with nutrition students.

Delialioglu and Yildirim (2008), investigated the effectiveness of the hybrid instruction in regard to students' achievement, knowledge retention, attitudes towards the subject, and course satisfaction in comparison to traditional classroom instruction with model for learning and teaching activities (MOLTA). They concluded that there is no significant difference between the hybrid course and the traditional course in students' achievement, knowledge retention, satisfaction, and attitude.

El-Deghaidy and Nouby (2008), attempted to determine the effectiveness of a hybrid e-learning cooperative approach to deliver a science teaching methods course in comparison to delivering the same course content by the same tutor in the form of traditional lectures. Their results indicated that Pre-Service Teachers in the experimental group had higher achievement levels in their post-overall-course test, "comprehensive-score", and attitudes towards e-learning environments compared to those of the control group.

Riffell and Sibley (2005), evaluated the effectiveness of the online portion of a hybrid course in an introductory environmental biology course for non-science majors and found that the hybrid course format was better or equivalent to the traditional course in regard to students' performance on a post-course assessment test. Specifically, online assignments were equivalent to or better than passive lectures, and that active-learning exercises were more effective when coupled with online activities.

At this point, most studies show that students seem to be more successful in the hybrid learning environment, but more research is needed in tertiary education to fully understand the effect of hybrid courses on student success in the educational environment (Atan, Rahman & Idrus, 2004).

Like many institutions, the DPESS-DUTh is exploring alternate delivery methods that will aid student learning and address some of the problems associated with traditional or online courses. The hybrid course delivery style is the approach being currently considered. Hybrid courses are being piloted at this time, but more information is still needed about student achievement, retention, and student satisfaction in the hybrid format compared to the wholly traditional classroom environment. In order for this new delivery style to be successful for students and instructors at the university, further analysis is needed to ensure a quality level of instruction is maintained and student success is taken into account. Therefore, the purpose of this study was to determine the effectiveness of a hybrid learning approach to deliver a computer science course concerning the Microsoft office PowerPoint 2003 program in comparison to delivering the same course content in the form of traditional lectures. More specifically, the study was conducted to explore the following four research questions:

(1) Should one or more items on knowledge test be deleted or revised to obtain a better measure of Microsoft office PowerPoint 2003 program?
(2) Do students, on average, report differently on knowledge test using the traditional lecture instruction (TLI) and the hybrid lecture instruction (HLI) teaching approaches?
(3) Do students, on average, report differently on knowledge test for the pre-test and post-test measurements?
(4) Do the differences in means for knowledge test between the TLI and HLI teaching method groups vary between the pre-test and post-test measurements?

3. Methods

3.1. Participants

This research involved one hundred seventy two ($n = 172$) first-year students of the DPESS-DUTh. Their age ranged from 18 to 20 years old ($M = 19$, SD = 1.01), while 96 of them were male (58.9%) and 67 were female (41.1%). The study population included students enrolled in every class section of 218 – New Technology in Physical Education course offered in spring semester of 2007. Participants were randomly assigned to one of the two different teaching methods: TLI (37 males and 33 females) and HLI (64 males and 38 females) creating two independent groups of 70 (40.7%) and 102 (59.3%) students respectively. Prior to group assignments, participants were orientated to the purpose of the study, the experimental group to which they belonged, the method by which it taught and obligations for participation in the experiment. All students in the two classes were asked to participate, but the procedures were different for the two course delivery formats. Each student was asked to give consent to participate in the study. Students were informed that participation was voluntary and would have no impact on their grades.

3.2. Apparatus

3.2.1. Hardware instrument

Eighteen 3.2 GHz Intel Pentium 4 class computers with an 800 MHz front side bus and Intel's new Hyper-Threading technology for increased performance during demanding operations such as complex multitasking running Windows XP professional SP2 were used. The computers equipped with 1024 MB RAM memory, a high-end nVidia GeForce Fx Go 5600 graphics controller with 128 MB of dedicated video memory, a 17-inch color LCD monitor, DVD-ROM, soundcard, microphone and small headset.

3.2.2. Software instrument

The Open eClass platform in version 2.1 was used to provide an alternative method of disseminating information to the traditional method approach. This platform is a complete Course Management System and it is the solution offered by the Greek Academic Network GUnet to support asynchronous eLearning services in tertiary education. It has been designed with the intention to supplement and support the conventional educational process. It is actively supported by GUnet and is distributed for free as open-source software. Its goal is the incorporation and constructive use of the Internet and web technologies in the teaching and learning process. At the same time, it supports the electronic management, storage and presentation of teaching materials, transcending limitations of space and time and creating the necessary conditions for a dynamic learning environment (GUnet Asynchronous eLearning Group, 2008). The platform was accessible via a simple web browser without any demands of specialized technical knowledge. Material for the Open eClass platform was taken from a Microsoft office PowerPoint 2003 textbook (Shelly, Cashman, & Sebok, 2005) and the university notes "New Technologies in Physical Education" (Antoniou & Siskos, 2005) modified for this study. 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).

The Open eClass platform started by logging the users in the platform (inserting 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 reposted. 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 Fig. 1).

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.

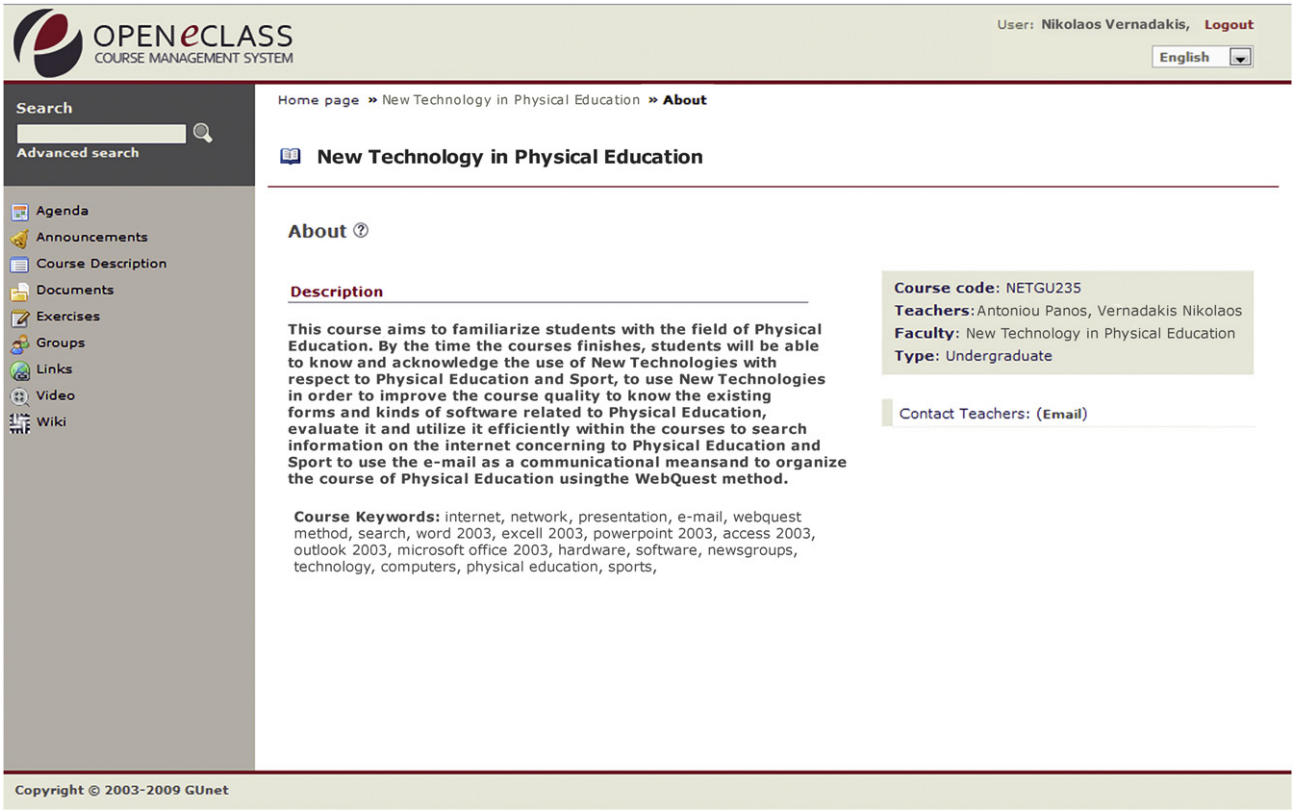

Fig. 1. The eCourse home screen in the Open eClass platform.

3.2.3. Knowledge instrument

A knowledge test was developed to determine students' achievement on cognitive learning of Microsoft office PowerPoint 2003 program. A table of specifications was developed to reflect the interrelationship between the identified course content and the levels of learning. Based on these specifications a 20-item, multiple-choice test was constructed. Each test item had four options in order to reduce the probability of guessing. The test construction was based on the linear model which required that the test scores were obtained by summing the number of correct answers with equal weighting over the items. The questions were written based on the university notes of the course "New Technologies in Physical Education" (Antoniou & Siskos, 2005), and the book "Microsoft Office PowerPoint 2003: Comprehensive Concepts and Techniques" (Shelly et al., 2005).

After the questions were constructed as explained above, a panel of experts in Microsoft Office PowerPoint 2003 teaching was used to evaluate and judge the content validity of the test instrument. This group reviewed the test items and established whether each item measured the target skill. Every time a set of changes was made, the questionnaire was reviewed again by the consultants, until the instrument was deemed adequate.

The revised version of the knowledge test consisted of a 17-item multiple-choice test. Questions included in the knowledge test fell into one of the following categories: a) building a presentation (3 questions), b) managing and viewing slides (3 questions), c) using slide layouts and themes (2 questions), d) inserting and drawing objects (3 questions), e) formatting text, objects and slides (3 questions), and f) working with hyperlinks, transitions and animations (3 questions). A pilot study was performed to access item difficulty and clarity of questions (Green & Salkind, 2007). Questions were scored one point (1) for a right answer and no point (0) for a wrong answer.

3.3. The course

In August 2007, a faculty team of "New Technology in Physical Education" course started a pilot project on creating a hybrid course in which a significant portion of the learning activities had been moved online and time traditionally spent in the classroom is reduced but not eliminated. The goal was to join the best features of in-class teaching with the best features of online learning to promote learner-centered, active and constructive learning. Using computer-based technologies, we redesigned the traditional course with new online learning activities, self-testing exercises, simulations, and online group collaborations. It took 6 months to develop and create the "interactive module of Microsoft office PowerPoint 2003 program". Since spring 2007, the hybrid course based on constuctivist learning environment has been offered by the Democritus University of Thrace, Physical Education and Sport Sciences Department as an obligatory course to first-year physical education students.

3.3.1. Goal and learning objectives

The purpose of these lessons (in both environments) was to help students acquire a deeper understanding of the "presentation planning, development and creation" issues in physical education using the Microsoft PowerPoint 2003 program. After attending this course, students would be able to understand the following major topics: the PowerPoint screen layout, building a presentation, managing and viewing slides, using slide layouts and themes, inserting and drawing objects, formatting text, objects and slides, and working with hyperlinks, transitions, sound effects and animations.

3.3.2. Learning method, and activities

Students in both environments (TLI, HLI) were required to build a prototype of their presentation in the initial stage of this course. In particular, each student was asked to assume the role of a Physical Education teacher working in a secondary school, and to prepare a PowerPoint presentation aimed at introducing his/her pupils to a specific physical education and health topic, chosen by the student. In the first 45-min of each class, the teacher lectured on the guidelines or mistakes and bugs of the presentation slides. Then, the students had 50-min to discuss with their team members about how to implement what they learned. When the online classes were delivered, students could synchronously discuss and collaborate on the construction of their presentations through online messenger and chat room. They could also asynchronously interact with team members in their exclusive forums. Moreover, when the classes were delivered in the classroom, students discussed and assigned their tasks in this physical learning environment. Students had to reconsider and modify the prototypes of their presentations according to the new knowledge they had just acquired.

In this experiment, the instructor initiated students in TLI and HLI into the field of presentation development, planning and creation. He first established the students' essential knowledge and developed required skills in the initial stage of the course. After students climbed the stiff learning curve and encountered bottlenecks, students were required to gather information and solve problems by themselves.

Online, the HLI instructor played a role different from the role of the TLI instructor, although the general issues and situations with which they must deal were essentially identical – to facilitate the process of active learning by students and foster the skills of critical thinking. However, the HLI instructor had to fulfill additional conditions for successful online tutoring, which can be categorized as pedagogical, social, managerial, and technical. Specifically, the HLI instructor facilitated their online classes by posting important announcements, guiding assigned readings and asynchronous discussions, answering student questions, and leading synchronous chat sessions.

The use of CMS environment was the main difference between the two groups. The amount of material covered in the hybrid learning course, and the depth with which it is covered, were in general equal to that of a classroom face-to-face course. The material presented was not overly comprehensive. The concept was to motivate students for active participation through which they could find the details themselves and come to a clear understanding of the topic. In designing the Microsoft PowerPoint 2003 lessons, researchers aimed to provide a variety of learning experiences that would encourage students to take a deeper approach to learning. A group-learning plan that was self-paced but bound to a strict schedule was created. The lectures were integrated with static (photographs, pictures) and interactive services (Flash interactive animations, calculators) and self-assessment features with immediate feedback.

On the days of online classes, students were required to be on the university computer lab in order to ensure the minimum engagement with the digital material. However, during the week students could browse the course material and work in the virtual classroom at any time and from any computer with an Internet connection.

3.4. Procedure

3.4.1. Pilot study

A pilot study was conducted to determine the reliability and validity of the knowledge test. Participants consisted of 72 first-year university students at Democritus University of Thrace. This population was chosen to keep the pilot study similar to the main study regarding participant's age. The method of instruction used for the pilot study was TI, which incorporated a direct style of teaching such as lectures, demonstrations, teacher questions and student questions. Participants were given two 95-min class periods of instruction and an overview concerning the Microsoft office PowerPoint 2003 program. The knowledge test was administered on the fourth day at the computer lab facility on the university campus. Eighteen Windows-based computer workstations were used in the knowledge test implementation. Each computer had access to an online selecting answers system for completion and submission of the 20 multiple-choice questions. Participants completed the knowledge test in a section-by-section manner, that is, after the completion of one question, the participant was asked to click a *next* button to go to the next question, until all questions were completed. The questionnaire was also designed with an embedded program so that if a participant chose to skip any item, a remark designed using JavaScript appeared requiring the participant to complete the missing item before he or she proceeded to the next section. After completion of the entire questionnaire, the participant clicked on a *submit* button, which sent the completed questionnaire to a secure server accessible only by the researchers. It was determined that participants would need approximately 30 min to complete all questions of this instrument.

3.4.2. Main study

After the pilot study, a main study was conducted to compare the scores obtained by 72 first-year university students in the knowledge test. The experimental design consisted of a pre-test, and a post-test for the two of the independent groups. The knowledge test was administered on the first day to measure participant's learning on the Microsoft office PowerPoint 2003 program. Procedures for the knowledge test were the same as the pilot test. There were three questions less, reducing the number of questions to seventeen (Appendix).

On the second day, the computer lab facility was set up according to the needs of the experimental procedure. In this facility there were 18 Windows-based multimedia computer workstations with the same infrastructure (hardware, software) and Internet connectivity. Computers were separated as much as possible to create individual workstations. Before the experiment started, the HLI group was given a 95-min introductory session on how to use the open eClass platform and its tools. Then, the responsible instructor of the course gave a 45-min lecture to all participants introducing the unit of Microsoft office PowerPoint 2003 program. Instruction, practice (activities), and testing for this study were held on six separate and successive weeks. The groups met for 95-min, each week.

The TLI method incorporated a direct style of teaching including lectures, activities, and discussion. Participants attended a typical live lecture that provided ample opportunity for teacher–student interaction (reviewing the lecture material through discussion). During the lecture, PowerPoint slides were used to present textual information, graphics, and a few animations. Immediately after the lecture, students were given computer activities to enhance and enrich teaching and learning in the computer lab. Specifically, each TLI group received six 95-min periods of instruction divided into 4 sections: a) 5-min briefly outline of the key learning points, b) 40-min lecture on general knowledge, c) 45-min constructivist-inspired learning activities that corresponded with the lecture content and d) 5-min summary on key learning points. Participants were allowed to work alone or with a partner. Oral instructions (feedback) could be given during the 45 min of activity.

Participants in the HLI method implemented both the combining asynchronous educational activities in the internet and traditional training activities in the classroom. The experimental structure of hybrid designing was followed on a one to three ratio (1/3). Two (2) instructive units were accomplished with the traditional teaching method in the classroom, while the remaining four (4) units with the use of asynchronous course management system open eClass. The two (2) traditional activities functioned as completion of each instructive unit (an educational goal), which ended, and at the same time introduced students to the next instructive unit. Each HLI group received six 95-min periods of instruction divided into 4 sections: a) 5-min briefly outline of the key learning points, b) 40-min e-lecture on general knowledge (video feed of the lecturer synchronized with PowerPoint slides), c) 45-min constructivist-inspired e-learning activities that corresponded with the e-lecture content and d) 5-min summary on key learning points. A member of the university assistant staff was present for organization and management supervision only. Participants were allowed to work alone or with a partner.

At the end of the treatment, the knowledge test that previously served as a pre-test was given to students as a post-test. During the experiment, the participants in the two groups had no access to hybrid or to traditional learning environments beyond what was utilized as part of the experiment. Both groups had the same learning conditions, such as topics and principles introduced in the treatments, and equal opportunities to achieve their learning outcomes. Material for the two method groups was taken from a Microsoft office PowerPoint 2003 textbook (Shelly et al., 2005) and the university notes "New Technologies in Physical Education" (Antoniou & Siskos, 2005).

3.5. Design

The experimental design used for the purpose of the study was a pre-test/post-test control group design, where participants were randomly assigned to the groups. Random selection has been considered in the use of a cluster sampling procedure to ensure that each class in the defined population has an equal chance of being selected to take part in the study (Gall, Gall, & Borg, 2007). Random assignment was accomplished by computerized generation of random student numbers and assignment to class sections based on those numbers. According to Gall et al., (2007), this experimental design was controlled for all major threats to internal validity except from one threat of external validity associated with interaction between pre-testing and experimental treatments. To avoid this threat, both groups (TLI, HLI) had the same learning conditions, such as topics instructional content, constructive assignments and principles introduced in the treatments, and equal opportunities to achieve their learning outcomes. The equivalence between participants of the two groups, ensured that the main variation was in the method of course delivery. In this case, post-test changes in the experimental group, could be attributed to the experimental treatment. More specifically, the experiment on Microsoft office PowerPoint 2003 knowledge test was a factorial design with teaching method groups (TLI and HLI) and repeated measurements (pre-test and post-test) as independent variables, and knowledge learning as dependent variable.

4. Results

Homogeneity of variance and Sphericity was verified by the Box's *M* test, the Levene's test and the Mauchly's test (Green & Salkind, 2007). Initial differences between the two groups for the mean knowledge scores were tested using independent-samples *t* test. An item analysis using the responses of the pilot study was conducted to determine the difficulty rating and index of discrimination. In determining the internal consistency of the knowledge test, the alpha reliability method was used. Two-way analyses of variance (ANOVA), with repeated measures on the last factor, was conducted to determine effect of method groups (TLI, HLI) and measures (pre-test, post-test) on knowledge test. Each variable was tested using an alpha level of significance .05. A listing of the results from the item analysis of the knowledge test in the pilot study can be found in Table 2. Means and standard deviation for the TLI and the HLI group in pre-test and post-test are presented on Table 1, while results of each analysis are presented separately below.

4.1. Item analysis

The pilot study knowledge test had a mean difficulty rating of 51.1%. When all items were analyzed, two questions, or 10% of the items, had unacceptable difficulty rating values. The utilization of a difficulty rating criterion of between 20% and 90% resulted in 90% of the items yielding an acceptable level of difficulty. The pilot study knowledge test had a mean index of discrimination of .48. When all items were analyzed, one question, or 5% of the items yielded an unacceptable index of discrimination values. The acceptable value for index of discrimination was .20 or higher. Acceptable index of discrimination values were observed for 95% of the items. As indicated by the information in Table 2, three of the items (8, 10 & 11) were therefore deleted from the test for the main study.

4.2. Reliability analysis

An alpha reliability coefficient .73 was computed based on the inter-item correlation coefficients of the pilot study knowledge test. According to Green and Salkind (2007), the reliability coefficient should be at least .70 for the test to be considered reliable. Thus, the determination was made that the pilot knowledge test was a reliable measuring instrument.

4.3. Two-way Analyses of variances (ANOVAs) with repeated measures

There were no significant initial differences between the two teaching method groups for the mean knowledge test scores, $t\,(170) = .25$, $p = .81$. A significant main effect was noted for the Time, $F\,(1, 170) = 35.49$, $p < .001$, while the interaction Time X Group was also significant, $F\,(1, 170) = 7.77$, $p < .05$. The univariate test associated with the Group's main effect was no significant, $F\,(1, 170) = 7.30$, $p = .32$.

Two independent-samples *t* test was conducted to follow up the significant interaction and assess differences among teaching method groups at each time period. Differences in mean ratings of knowledge performance between the two teaching groups were not significantly different at first measure, $t\,(170) = .25$, $p = .81$, while the TLI method group yielded a significantly lower mean rating at second measure, $t\,(170) = 2.34$, $p < .05$. The strength of difference in means scores for the teaching method groups was small to medium. The effect size, as assessed by Cohen's *d*, was $d = .034$ for the knowledge performance. As shown in Fig. 2, the difference in mean knowledge test scores was lower for the TLI method group at post-test measure.

Finally, two paired-samples *t* tests were conducted to follow up the significant Time main effect and assess differences across time at each teaching method group. Differences in mean rating of knowledge test in TLI group were significantly different between pre-test and post-test, $t\,(69) = 4.56$, $p < .001$. Similar, differences in mean rating of knowledge test in HLI group were significantly different between pre-test and post-test, $t\,(101) = 5.52$, $p < .001$. The magnitude of the effect as assessed by Cohen's *d* was small to medium $d = .030$ for TLI and medium $d = .048$ for HLI. As shown in Fig. 2, the post-test knowledge scores were remarkably greater than pre-test knowledge scores for the two groups.

5. Discussion

As online learning continues to grow, many institutions are looking for alternate delivery methods to help solve some of the problems typically associated with the wholly traditional or online environment. One approach being adopted is the hybrid or blended learning model, one that combines the flexibility of online courses with the familiarity of traditional on-campus courses.

The DPESS-DUTh had piloted the hybrid course delivery style, but more information was still needed about student achievement in the hybrid format compared to the wholly traditional classroom environment. Therefore, the purpose of this study was to determine the effectiveness of a hybrid learning approach to deliver a computer science course concerning the Microsoft office PowerPoint 2003 program in comparison to delivering the same course content in the form of traditional lectures. Constructivist theory was the framework to guide this study.

Analysis of the data illustrated a significant difference between the hybrid student scores and the traditional student scores in the knowledge acquisition of Microsoft office PowerPoint 2003 program. Moreover, the data showed that both groups improved their cognitive

Table 1
Means and standard deviations for pre-test and post-test scores of the two groups on knowledge test.

	Group	*N*	*M*	*SD*
Knowledge Test lst measure	TLI	70	8.37	2.56
	HLI	102	8.25	4.13
Knowledge Test 2nd measure	TLI	70	9.09	2.16
	HLI	102	10.22	4.13

Table 2
Summary of Item Analysis for pilot study knowledge test.

Questions	Difficulty rating	Index of discrimination	Results
1	48.3%	.52	Retained
2	68.0%	.32	Retained
3	72.7%	.27	Retained
4	47.7%	.52	Retained
5	64.5%	.35	Retained
6	37.2%	.63	Retained
7	58.1%	.42	Retained
8	19.1%	.71	Eliminated
9	55.2%	.45	Retained
10	17.4%	.83	Eliminated
11	74.4%	.16	Eliminated
12	49.4%	.51	Retained
13	64.0%	.36	Retained
14	34.9%	.65	Retained
15	58.1%	.42	Retained
16	69.8%	.30	Retained
17	40.7%	.59	Retained
18	54.7%	.45	Retained
19	57.0%	.43	Retained
20	30.8%	.69	Retained

learning and skill development in this particular presentation program. Overall, results indicated that both delivery methods did have a significant effect on student performance with those students involved with the HLI teaching approach achieving higher scores than those participating in TLI teaching approach.

This finding was fairly consistent with other studies in the literature which seem to indicate that student success rates in hybrid courses were equivalent (Delialioglu & Yildirim, 2008) or slightly superior to traditional courses (Atan et al., 2004; El-Deghaidy & Nouby, 2008; Zubas et al., 2006). In addition, studies have shown that most online learners do prefer some face-to-face contact with instructors and tend to be more successful when this occurs, thus supporting the hybrid course model (Riffell & Sibley, 2005).

A possible explanation for the above results could be that the use of the asynchronous course management system open eClass allowed users to become active participants in the learning process. Specifically, open eClass platform allowed cognitive learning to take place through the use of constructive assignments, supporting learners to become discoverers and examiners of knowledge through the use of computers and the Internet. Furthermore, it seems that a) the possibility for multiple reviews of the e-lecture during the course, b) the perceived role of the instructor and c) the time separation between study and live interaction phases encouraged students in the HLI group to adopt a strongly acquisitive mode of learning in their effort to get prepared for the post-test as adequately as possible.

Another possible explanation could be that students came from a cohort familiar with each other for a semester. It seems that familiarity of participants may have acted as a vehicle to learning the content presented via the asynchronous course management system open eClass. Also the social context, which occurred through face-to-face and online interaction provided for opportunities of social discourse between participants in a form of peer-tutoring.

Evaluating the outcomes of the present research study, greater consideration needs to be given to those factors that might strongly affect students' learning. First, students were only from the DPESS-DUTh. A larger and more diverse sample would provide a more stringent test for cognitive learning and skill development on a presentation computer program. Additionally, the results reported in this study are based on a single asynchronous course management system. This is a case-specificity problem. It is possible that a different type of course management system package covering different content would yield different results.

Secondly, no attempt was made to control possible differences in computer skills and course management system experiences of the students or the effective learning time of the students' real engagement in the learning process. If these limitations have been controlled and the effective learning time had lasted longer, the researchers might have reported more precise results for the effectiveness of TLI, and HLI methods on cognitive learning and skill development of the Microsoft office PowerPoint 2003 program. For those reasons, further research may be needed to replicate this study.

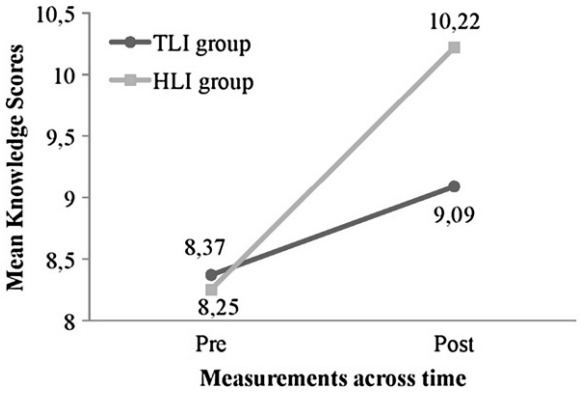

Fig. 2. Performance of the two groups on all measurements across time of the Knowledge Test.

Finally, an important limitation of this study was the students' background and the fact that their learning styles had not been taken into account in any way. It is questionable whether the same results can be obtained with students of a different background. Moreover, since e-lectures and live lectures had different socio-cognitive underpinnings they possibly do not equally fit students with different learning styles. Research can provide evidence on how students' different backgrounds and learning styles may interact with the mode of presentation.

Those limitations of the research learning environment may have significantly affected the experimental groups' ability to learn the Microsoft office PowerPoint 2003 program. However, it would be difficult to be certain, that the HLI group would have been more successful than TLI group on cognitive learning if the above limitations could have been eliminated. In that sense, these results indicate that students can be taught through the use of multiple effective teaching techniques.

6. Conclusion

In the literature, there is a limited number of research studies that examine students' achievements in hybrid instruction based on constuctivist learning environment. In that sense, the current study revealed valuable insights that could help and guide other instructors and designers in developing hybrid courses. Before highlighting the implications of this study, it should be noted that "what the ideal bled for a successful hybrid course" has not been clarified yet. On the other hand, "blending" seems to provide a bridge for new technologies to be integrated into tertiary instruction.

Based on the research and the analysis of the data, this study not only has significant practical implications for the educational courses at Democritus University of Thrace in Greece and it's students, but also provides contributions to the current literature related to hybrid learning, constructiveness and computer-supported constructive work. First, all these data indicate that the "hybrid" mode of teaching and learning facilitates the students' understanding on planning, development and creation of a PowerPoint presentation through a series of appropriate constructive activities. It seems that this hybrid learning enviroments provided opportunities for the participants to learn subjects relative to the first two cognitive processes in Bloom's revised taxonomy (Anderson et al., 2001), namely remembering and understanding factual and conceptual knowledge. This in turn is the first step to establish a consistent delivery style for the hybrid format that will help ensure student success.

Second, unlike Spickard, Alrajeh, Cordray, and Gigante (2002), researchers included a live instructor-student discussion component both for TLI and HLI groups. This feature adds ecological validity to current approach since most instructional designs are expected to include such instructor-student interaction to facilitate learning.

In addition, unlike Zubas et al. (2006), researchers offered the e-lecture as study material and not as an optional review resource. This research therefore provides evidence about the actual potential of e-lectures to support learning and not simply about the patterns of their possible usage by students.

Finally, due to limited feedback about hybrid courses at DPESS-DUTh, this study will add to the overall state of knowledge on the topic. When combined with other studies and feedback from this institution and others, this study will give DPESS-DUTh and other universities a better picture of what is needed to make hybrid courses successful and viable.

Conclusively, the findings suggest that, in combination with traditional classroom teaching, the use of hybrid lecture instruction can provide a slightly more efficient learning environment compared to the traditional lecture instruction. This result is promising since students having classroom seat time reduced by 2/3 were more successful than the students of traditional instruction. This means about 67% of seat time, teaching time and cost reduction. Can this finding be a solution for logistic problems and a key factor to deal with the high demand for university degree? That might be a generalization beyond the effect size of this study, but we can say that hybrid instruction "works" for "PowerPoint presentation" subjects/issues/topics in physical education. To make more generalizations there is a need for further research studies in different subject area, at different students' levels, and with different design and development models. In the light of the findings, it can be concluded that there is no evidence against using hybrid course as an integral part of instructional design in tertiary education specific to "PowerPoint presentation" subjects/issues/topics in physical education.

Appendix

Knowledge Instument
Circle or underline the correct answer

1. Which of the following should you use if you want the entire slide in the presentation to have the same "look"?
   a. the slide layout option
   b. add a slide option
   c. outline view
   d. a presentation design template *
2. How can you create a uniform appearance by adding a background image to all slides?
   a. Create a template
   b. Edit the slide master *
   c. Use the autocorrect wizard
   d. All of the above
3. Which of the following should be used when you want to add a slide to an existing presentation?
   a. File, add a new slide
   b. Insert, New slide *
   c. File Open
   d. File, New

4. Which of the following tool enables you to add text to a slide without using the standard placeholders?
   a. Text tool box *
   b. Line tool
   c. Drawing tool
   d. Auto shapes tool
5. Which of the following provides a means of printing out feature notes with a miniature slide on a printed page?
   a. Slide with animation
   b. Outline view
   c. Notes page
   d. Audience handout *
6. In Microsoft PowerPoint in order to see all the slides on one screen use:
   a. view, slide sorter *
   b. view, slide
   c. view, master
   d. view, slide show
7. What's the best way to design the layout for your slides?
   a. Create layouts for slides, handouts and notes using the Master Layout dialog box in slide master view
   b. For each new slide, select a layout from the Slide Layout task pane *
   c. Apply templates from the Slide Design task pane
   d. None of above
8. The slide that is used to introduce a topic and set the tone for the presentation is called the (Eliminated)
   a. table slide
   b. graph slide
   c. bullet slide
   d. title slide *
9. You have got a bunch of digital holiday photo you want to put into a slide show. What the quickest method?
   a. Apply a multiple-picture layout to several slides, and use the clipart icon on the slides to import your picture
   b. On the insert menu, point to the picture, click from file, and select your picture in a group for each slide
   c. On the insert menu, point the picture and click new photo album *
   d. All of the above
10. You were giving your presentation, and you need to click a slide that's few slides back. How do you get there? (Eliminated)
    a. Press ESC to get back into a normal view; click the slide thumbnail in normal view; then click the resume slide show button
    b. Press backspace until your desired slide
    c. Right click, point to go on the shortcut menu, point to by title, and click the slide you want to go to *
    d. All of above
11. After moving a clip art image to a particular location on the slide, you can immediately reverse the action using the (Eliminated)
    a. Click the not do move object command on the edit menu
    b. Click on the undo button *
    c. Click on redo button
    d. All of above
12. To create a PowerPoint presentation from a template:
    a. Click File, New, select the presentations tab and choose a template *
    b. Click File, New Template and choose a template
    c. Import a presentation template from PowerPoint's template wizard
    d. Click Create Template from scratch, Now
13. To save a presentation you
    a. click save on the windows start button
    b. press Ctrl + F5
    c. select File, Save from the menu *
    d. click the saver button on the formatting toolbar
14. To change font size of a selected slide title, you?
    a. Click the toolbars font dropdown arrow and choose the font you prefer
    b. Click format, title and choose a font from the font tab
    c. Click the toolbar's increase font size button *
    d. Click title, new font, ok.
15. We can replace a font on all slides with another font using the option:
    a. Edit, Fonts
    b. Tools, Fonts
    c. Tools, Replace Fonts
    d. Format, Replace Fonts *
16. A chart can be put as a part of the presentation using:
    a. Insert → Chart
    b. Insert → Pictures → Chart *
    c. Edit → Chart
    d. View → Chart

17. Which of the following are actions you can assign to an action button or slide object?
    a. Run a macro
    b. Play a sound
    c. Hyper link
    d. All of above *
18. One way to make a PowerPoint slide display animations is to:
    a. Select the slide in normal view; and click Format, Animation
    b. Click the PowerPoint window and move it around vigorously with the mouse for a manual animation effect
    c. Select the slide in slide sorter view, right click and choose preset animations from the shortcut menu *
    d. PowerPoint does not have an animation feature
19. To give a PowerPoint presentation to a large audience, you:
    a. Set up your computer in a large auditorium, and click large, auditorium, OK
    b. Click the slide you wish the audience to see in normal view, then click the next slide, and so on.
    c. Choose either view, slide show or slide show, view show *
    d. Slick slide show, OK
20. Which PowerPoint view works best for adding slide transitions?
    a. Slide show view
    b. Slide sorter view *
    c. Slide view
    d. Notes view

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