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Athens 2004 Team Leaders' Attitudes toward the Educational Multimedia Application "Leonidas"

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ABSTRACT

The purpose of this study was to adapt the questionnaire Multimedia Attitude Survey (MAS; Garcia, 2001) to the Greek population in order to evaluate the educational multimedia application "Leonidas" considering the attitudes of ATHENS 2004 team leaders. In addition, the differences among the sex were also investigated. Participants were 232 team leaders, between the ages from 33-44 years old. One hundred twenty two (52.6%) of the participants were men and one hundred ten were women (47.4%). Data was collected using an on-line survey at the end of this study. Results from the factor analysis yielded eight factors accounting for 89.98% of the variance. Reliability analysis indicated a satisfactory internal consistency estimate of reliability for the attitude questionnaire. Independent-samples t test analysis revealed significant differences between the two sex groups, in the case of one factor: "general experience". In the factor above the women reported better results. In conclusion the team leaders' feedback from the questionnaires indicated a general level of satisfaction and contentment with this particular multimedia application. The scale adapted in the present study can be a useful tool for the evaluation of other relative multimedia applications by multimedia developers. Nevertheless, further examination is warranted in order to obtain additional information concerning the difficulties of multimedia experience on employees' attitudes toward multimedia applications.

Keywords

Multimedia application, Attitude, Olympic Games, Gender, Technology

Introduction

Technology offers a promising resource (via computer networks, distance learning systems, multimedia software, and video materials) for training staff and volunteers, sharing information about promising practices, and reducing the isolation of many programs. The new technologies offer ways of individualizing instruction to meet the needs of types of learners and potentially to reach all types of learners in ways they learn best.

So, is there any value added by using technology in adult education? As with so many other innovations, the value is not intrinsic, but rather depends on how and for what purposes one uses the innovation. Simply adding technology without challenging ourselves to do things we could not do before, or to do them differently, is meaningless at best, and very expensive at worst. On the other hand, technology applications and activities that lead to expanded opportunities for learning can only help adult learners acquire the skills and mastery of tools to support independent, lifelong learning.

Multimedia computer-assisted instruction (MCAI) is increasingly being used as a means of delivering educational content in organizations training. Efficiency, portability, consistency, and effectiveness have all been cited as reasons for employing this technology in the company's educational environment. These visual learning symbols, pictures, and other representative techniques allow students to go deeper into ideas and concepts (Chandler, 2003).

However, the rapid growth of multimedia implementation in learning settings does not guarantee participation and acceptance on the part of employees. Negative attitudes towards multimedia-based instruction could be a deterrent to using multimedia technology as a learning tool. Therefore, the thoughts, tendencies and attitudes of the learners' towards these tools are needed to be determined (Becker and Maunsaiyat, 2002; Christensen and Knezek, 2000; İşman and Dabaj, 2004; Selwyn, 1997).

Awareness of employees' attitudes toward MCAI is a critical criterion in the evaluation of multimedia courses and in the development of multimedia computer-assisted curricula. Attitudes toward multimedia-enhanced instruction are considered to influence not only the acceptance of this medium of instruction, but also future behaviors in the learning process. For this reason, the promotion and maintenance of positive attitudes toward MCAI is of paramount

importance. Negative attitudes must not be allowed to limit the knowledge and creativity of learners, nor anxiety to interfere with the learning process. If the utilization of multimedia teaching/learning environments is to be maximized, attitudes toward these learning settings must be continuously monitored. Fast, effective instruments to assess attitudes toward multimedia instruction are crucial to this process.

There is a wealth of computer attitude scales available in the literature. Many instruments have been developed with the purpose of measuring computer anxiety, computer usage, computer appreciation, and other computer-related attitudes (Jones and Clarke, 1994; Kay, 1993; Selwyn, 1997). There are a number of studies which provide useful empirical comparisons of available computer attitude scales (Gardner, Discenza & Dukes, 1993; Woodrow, 1991). All the previous references to existing surveys focus on general attitudinal parameters rather than on in-depth attitude- related dimensions. Besides, all the surveys reviewed explore learners' attitudes towards computers, and none of them elicit students' perceptions toward multimedia instruction as such.

Garcia (2001) reported a practical, multi-dimensional, easy-to-administer research tool specifically intended to assess the attitude of learners towards multimedia-enhanced instruction. The specificity of this 25-item instrument constituted a powerful tool for the assessment of student attitudes towards multimedia technology when this was used for educational purposes. This instrument was tested by Garcia on 40 subjects. The internal reliability coefficient for each of the attitude sub-scales making up the survey - student attitudes on individualized instruction; student attitudes toward self-paced instruction; student attitudes toward the user-friendliness of the learning-environment; student levels of anxiety when working with multimedia; and the general opinion of the students toward their experience with the instructional material - showed a high degree of internal consistency. The independence of these subscales has allowed practitioners, evaluators and researchers to make their own selection of factors in order to adapt the survey to meet their own needs with an eye toward evaluating and predicting the performance of learners in a multimedia-enhanced learning setting.

Cardoso, Peralta & Costa (2005) examined the attitudes and the perceptions of the Portuguese students about educational multimedia software's criteria of quality. Their study was part of an international project supported by EU (PEDACTICE - Educational Multimedia in Compulsory School: From Pedagogical Assessment to Product Assessment), and the sample of interviewed pupils can be considered as representative of the Lisbon schools, attended by teachers and pupils very much interested in multimedia materials. The results indicated the confirmation of the success of computers and multimedia among the young Portuguese student population, being manifest either in their attitudes or in the diversity of their experiences, including the technical mastery of informatics.

Teoh and Neo (2007) investigated students' learning impact and attitudes towards independent learning and self-paced discovery. A set of multimedia tools were employed to create the student–centred learning environment and were designed using Gagne's Nine Events of Instructions which provides a proper theoretical framework of a good instructional lesson plan. In general, this study has found that interactive learning using this Multimedia-based environment is feasible and is a viable alternative to the traditional classroom which has proved to be limited in achieving the necessary needs of the students in the modern learning context. Students were positive towards active learning and were confident in enforcing self-paced strategy. This is a viable learning strategy and should be encouraged by educationists.

Gandole, Khandewale & Mishra (2006) examined the effect of multimedia software support on the attitude towards electronics subject of students while working in laboratory of electronics science. The investigator developed an attitude scale having 25 items by covering various aspects related to electronics experiments and laboratory communication. There were 21 positive and four negative items on five-point scale (Likert type). The difference of points in pre test and posttest decided the change in Attitude. The findings showed that the multimedia software support used for laboratory communication was much effective in bringing an attitudinal change among the students. There was a remarkable enhancement in attitude for all items.

Numerous studies have indicated sex differences in computer attitudes whereby males hold more positive and less negative attitudes and females vice versa (e.g. Bebetsos, Kouli & Antoniou, 2007; Ho & Lee, 2001; Schumacher and Moharan-Martin, 2001). Equally there is evidence that denies a difference (e.g. Antoniou, Patsi, Bebetsos & Ifantidou, 2006) or conversely finding that females liked computers more than males (Keasar, Baruch & Grobgeld-Dahan, 2005). North and Noyes (2002) found that the impact of psychological gender (sex and sex-role), does not influence significantly attitudes or cognitions towards computers. This does not support the notion that a

technological gender gap is developing, nor the literature that suggests males hold more positive attitudes and cognitions than females. However, in this instance it appears that the computer is viewed positively.

In general, the relationship between computer attitudes and gender is not straightforward. Although research implies that males hold more global positive computer attitudes, there is evidence that on certain aspects females view computers more favourably than males. This is in relation to elements of computer culture, on certain new technology items or when computers are presented as useful tools. In addition, it has been suggested that whilst males view computers as more appropriate for them, females regard computers as more gender neutral than males and do not regard mathematics ability as a prerequisite. This supports the finding that males hold more gender-stereotypes of computers than females (Sanders, 2006; Whitely, 1997).

Learners' attitudes have contributed to our understanding of why MCAI have enhanced achievement and performance and motivation. Multimedia applications are profit tools for individual and student-centered learning, so, in order to be informative, effective and attractive on their use, they should have a clear view of the students' attitudes on the use of multimedia. Learners are no doubt the most important stakeholders in what concerns the use of educational multimedia software. However they are seldom questioned about their interests, difficulties or suggestions on this matter (Cardoso, Peralta & Costa, 2005). That's why this study takes the learners' point of view about quality of educational multimedia software as its main concern.

The leading aim of this study was to adapt the Multimedia Attitude Survey (MAS; Garcia, 2001) to the Greek population in order to evaluate the educational multimedia application "Leonidas" considering the attitudes of ATHENS 2004 team leaders. In addition, the differences among the sex were also investigated. Some more specific objectives come out from the following three research questions:

1. Is there a single dimension or are multiple dimensions underlying the 25 attitude items toward the multimedia application?
2. How reliable is our 25-item measure of attitude control?
3. Does the average amount of students' attitude differ between males and females?

Methods

Participants

Participants in this study consisted of two hundred thirty two (n=232) employees who were enrolled in "Team Leaders" Training Program at Organizing Committee for the Olympic Games ATHENS 2004 during Spring 2004. One hundred twenty two (52.6%) of the participants were male and one hundred ten were female (47.4%), between the ages from 33-44 years old.

Instrumentation

Software instrument

The multimedia application "Leonidas" was developed by the education and training department to support the "Team Leader" Training Program of the Organizing Committee for the Olympic Games ATHENS 2004. The material was constructed using the following programs: a) Macromedia Flash MX 2004, b) Adobe in Design 2.1, c) Adobe Photoshop 7.0 and d) Adobe Premiere Pro. The multimedia application run under Windows and Mac personal computer systems and was divided into five theme groupings: 1. Introduction, 2. Leadership, 3. Leader & Team, 4. Team Leader Skills and 5. Audit & Evaluation (see figure 1).

In order to help the team leader implementing the required policies, providing members of his/her challenge of pressing Games-time conditions and contribute to their success, "Leonidas" included the use of a simple language, a host of interactive applications such as audio flash movies and video, a wealth of photographic and other high quality illustrative material.

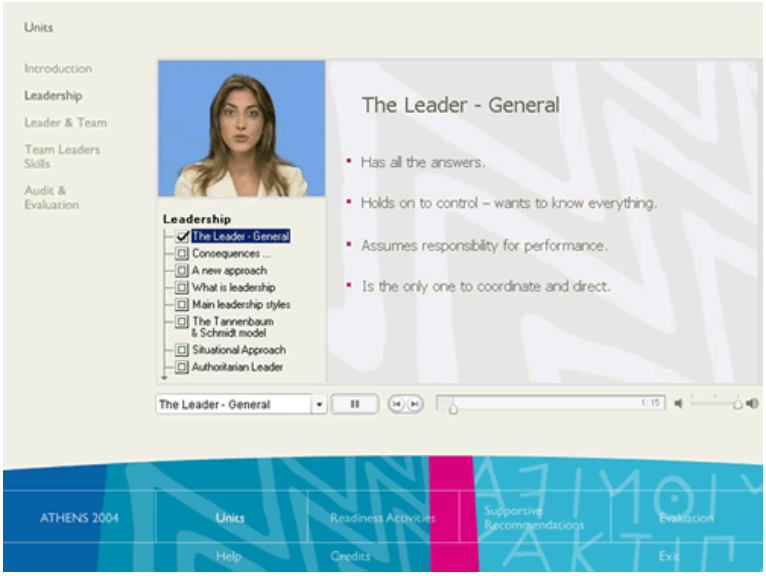

Figure 1. Example screen from the multimedia application "Leonidas"

The multimedia application consisted of 905 pages; 10 pages were introductory, 7 were main menus, 486 were information, 124 were practice, 243 were feedback and 35 were help. At the end of each topic and sometimes in certain sub-topics, a quiz was provided which contained 10 multiple-choice questions on the material. In this quiz learners were asked to resolve various readiness situations and giving responses to scenarios of potential problems. The users had the ability to navigate through the path structured by the programmer via the site map or from the menu appearing on each page.

Attitude instrument

The MAS questionnaire (Garcia, 2001) consisting of 25 items and one open-response item was adapted in order to elicit relevant information on the participants' attitude towards using the multimedia application "Leonidas".

The repeated forward–backward translation procedure was adopted as it is most commonly quoted in the adaptation and translation process (Carlson, 2001) and was considered to be the best within the strategies which were pragmatically possible. In this procedure a forward translation is made from the source original language to the target new language. The target language version is then translated back into the source language and compared to the original version. Errors in the target language version are identified through changes in meaning that arise in the back translation.

The procedure was broadly divided into four phases. Phase 1 was to make four Greek translated versions of the original survey and unify these four. Phase 2 was to produce a back-translated version. Phase 3 was to check the equivalence between the original survey and the back-translated version. Phase 4 was to continue forward and backward translation until satisfactory equivalence was agreed.

In Phase 1, two pairs of two bilingual and bicultural colleagues of the ATHENS 2004 translation department were separately asked to translate the original scale into Greek while discussing among in pairs about content, semantic and conceptual equivalence between the original and their translation. All the translators were fully informed of the objectives of their role in the whole procedure.

One of the authors (whose first language was Greek) unified the two Greek translations created by this process into a single translated version. Selection among alternative Greek translations was based upon perceived ''naturalness'' of the linguistic expression in the Greek language version.

In Phase 2, a further pair with a native English speaker and a native Greek speaker, both unaware of the original scale, was identified. They were asked to back-translate the Greek version produced in Phase 1. Again, they were professional translators, and were required to discuss content, semantic and conceptual equivalence and to emphasise meaning rather than word-to-word translation.

In Phase 3, a panel of two language experts, two software industry professionals, and two educational leadership content experts compared the original scale and the back-translation brought about by Phase 2, and checked for semantic discrepancies. In Phase 4, the author altered the Greek expression of the parts found to be problematic in Phase 3 with reference to any alternatives rejected in Phase 1. The pair used in Phase 2 re-translated them into English. The panel of experts used in Phase 3 checked discrepancies between the original scale and the re-translation. Detailed discussion of cultural difference and nuance ensured semantic equivalence and aimed to overcome conceptual differences by identifying parallel concepts that might be perceived as stressful. More specifically, the language experts helped eliminate unintended complexity and imprecision in wording. They remarks also helped ensure cultural neutrality and detect wording that might bias responses. Software industry professionals and educational leadership content experts suggested ancillary constructs and operationalization techniques suitable to the goals of the study, in addition to critiquing the instrument for clarity. These experts reviewed questions in such detail that in some cases they identified individual words that 'didn't feel right'. This process was repeated until problems were resolved.

According to expert's recommendation, a few of the items were modified to meet the team leaders Olympic Games milieu. Moreover, the open-ended question was also excluded from the selected parts, since there were only six participants that wrote some comments about the multimedia application.

The modified questionnaire contained twenty five (25) items on a format that used a 5-point Likert-type scale (1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strongly agree). This format allowed participants to select a response from “1,” to “5,” representing their disagreement or agreement on the particular item respectively where “3” stood for a neutral response (see Table 2).

Procedure

Students enrolled in “Team Leaders” Training Program of the Organizing Committee for the Olympic Games ATHENS 2004, were invited to participate in a study designed to understand the user attitude levels of a multimedia application used as a supportive tool for a course in a traditional classroom. The researchers administered the questionnaire during the last class session on the ninth week of the training program due to the nature of the questionnaire, since the questionnaire is typically offered to users after they have completed a session of work with the particular multimedia application. Students were informed verbally and briefly on the research topic and the questionnaire. Participation of the students was voluntary since confidentiality was guaranteed (i.e., students did not place their name on any of the materials in the study). Participants were presented with a letter of informed consent and provided the URL to the online survey. No technical errors were encountered during the completion of the online survey. Data were analyzed using SPSS 13 statistical software.

Design

Due to practical limitations, a field experiment, instead of a laboratory experiment was conducted to test the hypotheses. The experiment was a factorial design with sex groups (males and females) as independent variables, and attitude performance as dependent variable.

Factor analysis was conducted to identify underlying clusters or relationships concerning the learners' attitude towards the multimedia application “Leonidas”. In determining the internal consistency of the attitude scale, the alpha reliability method was used. Independent-samples t test analysis was conducted to investigate the differences of this attitude among the sex of the participants.

The hypotheses of this study were:
H1: There are multiple dimensions underlying the 25 attitude items toward the multimedia application.

H2: The 25-item measure of attitude control is reliable.
H3: The males will have more positive attitudes than females toward the multimedia application.

Results

Means and standard deviations for each factor in this study are presented on Table 1, while the means and standard deviations for the sex groups are presented on Table 3. The results of each analysis are given separately below.

Table 1. Means[1] and standard deviations for each factor

Factors	N	Mean	S.D.
Individualized instruction	232	4.25	.70
Self-paced instruction	232	4.22	.66
Involvement	232	3.48	.63
General experience	232	3.73	.88
Interaction	232	3.63	.97
Learner's control	232	3.64	.75
Anxiety	232	3.73	.43
User-friendliness	232	4.47	.63

[1] Scale: 1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strongly agree

Factor analysis

A principal component analysis of the 25-item scale was performed in order to investigate the underlying dimensions of the educational web site's evaluation, using the SPSS Factor Analysis program. Prior to performing principal component analysis the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .35 and above. The Kaiser-Meyer-Oklin values was .769, exceeding the recommended value of .6 and the Bartlett's Test of Sphericity =5304.243, reached statistical significance ($p<.001$), supporting the factorability of the correlation matrix (Tabachnick, & Fidell, 2001).

Results indicated that our initial hypothesis of multidimensionality was correct. The principal components analysis revealed the presence of eight components with eigenvalue exceeding 1. An inspection of the screen plot revealed a clear break after the eighth component. Based on screen plot and the eigenvalues, it was decided to retain eight components for further investigation. To aid in the interpretation of these eight components, Varimax rotation was performed (Stevens, 1996). The rotated solution (presented in Table 2) revealed the presence of simple structure, with eight components showing a number of strong loadings, and all variables loading substantially on only one component. The eight factors solution explained a total of 89.98 per cent of the variance, with component 1 contributing 15.98 per cent, component 2 contributing 12.45 per cent, component 3 contributing 12.26 per cent, component 4 contributing 11.92 per cent component 5 contributing 10.87 per cent, component 6 contributing 10.85 per cent, component 7 contributing 7.89 per cent and component 8 contributing 7.74 per cent. The interpretation of the eight components was defined as follows:
(1) Individualized instruction, (4 items)
(2) Self-paced instruction (3 items)
(3) Involvement (3 items)
(4) General experience (4 items)
(5) Interaction (3 items)
(6) Learner's control (3 items)
(7) Anxiety (3 items) and
(8) User-friendliness (2 items).

Table 2. The rotated loading matrix from the factor analysis[1]

Items	1	2	3	4	5	6	7	8	H^2
I enjoyed doing this exercise by myself.	.984								.995
I would have liked to have had a partner to work within these multimedia lessons.	.972								.976

The multimedia exercises turned out to be efficient thanks to the fact that there was only one student per session.	.937								.921
I liked working with the application without having to share it with other students.	.947								.929
To be able to work at my pace resulted in a more effective instruction.		.917							.957
I feel more motivated when I am allowed to work at my own pace.		.948							.953
I did not like to be left working at my own pace		.938							.943
The time flew while I was working with the multimedia lessons.			.939						.955
I had the feeling that the time to finish with the multimedia sessions never got to its end.			.922						.920
As soon as I start to work with the multimedia lessons I feel immersed in the activity.			.952						.932
The software I have worked with looks good to me.				.855					.879
The multimedia lessons are well designed.				.910					.900
The lessons have been planned out well.				.749					.872
In general. it has been a good experience to work with the interactive lessons.				.751					.762
The interaction with the instructional material through the computer was pleasant					.762				.817
The interactions with the computer were more positive.					.852				.799
The interactions with the computer made me be more attentive all the time					.718				.620
When exploring the program I was not happy when I found out that it was me who had to decide what needed to be done at every step.						.816			.862
I was grateful for the freedom I was given to explore the activity in my own way.						.892			.939
I did not like to be able to navigate freely throughout the program						.848			.932
The lessons with interactive multimedia make me feel tense.							.853		.964
I get nervous when I think that I am going to study lessons with multimedia technology.							.818		.856
When I examine material with interactive multimedia I feel comfortable.							.616		.856
I did not find the program confusing to use.								.932	.976
The program was user-friendly.								.888	.982
% of variance	15.98	12.45	12.26	11.92	10.87	10.85	7.89	7.74	
Total variance									89.98
Eigenvalue	3.997	3.112	3.066	2.980	2.719	2.715	1.973	1.935	

[1] H^2 = communalities

Reliability analysis

Coefficient alpha is the statistic mostly used to assess the internal consistency. The Cronbach-alpha coefficient was calculated for each of the sub-scales. The *"Individualized instruction"* factor had an a =.83, the *"Self-paced instruction"* had an a =.89, the *"Involvement"* factor had an α =.86, the *"General experience"* factor had an α =.86, the *"Interaction"* factor had an α =.75, the *"Learner's control"* factor had an α =.90, the *"Anxiety"* factor had an α =.82 and the *"User-friendliness"* factor had an a =.79. Although statistical texts (DeVellis, 1991) suggest that scale with reliabilities more than 0.70 should normally be considered as acceptable, in practice lower limits have been set up as acceptable by researchers.

Independent-Samples *t* Test analysis

An independent-samples *t* test was conducted to evaluate the hypothesis that males have more positive attitudes than females toward the multimedia application. There was significant difference in scores for males (M=3.46, SD=.77) and females (M=4.00, SD=.52) in the factor "*General experience*" $t(230)=9.452$, $p<.01$. As shown in Table 3, the females scored significantly higher in the above factor, counter to the research hypothesis. No significant difference was found between the two sexes groups in any case of the remaining seven factors of the MAS.

Table 3. Means[1] and standard deviations for the sex groups in each factor

Factors	Males			Females		
	N	Mean	S.D.	N	Mean	S.D.
Individualized instruction	122	4.28	.70	110	4.21	.66
Self-paced instruction	122	4.19	.63	110	4.23	.68
Involvement	122	3.49	.74	110	3.47	.74
General experience	122	3.46	.77	110	4.00	.52
Interaction	122	3.59	.87	110	3.67	.84
Learner's control	122	3.63	.78	110	3.66	.73
Anxiety	122	3.72	.59	110	3.74	.53
User-friendliness	122	4.44	.68	110	4.50	.62

[1] Scale: 1=strongly disagree, 2=disagree, 3=neither disagree nor agree, 4=agree, 5=strongly agree.

Discussion

This study adapted a questionnaire in order to evaluate the multimedia application "Leonidas" considering the attitudes of Athens 2004 employees. The study also sought to investigate differences among the sex of the participants. Results indicated that the evaluation on a pedagogic multimedia application was a multidimensional concept. This fact has been proved from other studies that have examined the role of the multimedia application as an educational tool (Garcia 2001; Selwyn, 1997). As a result of the factor analysis conducted in each of the pre-defined subscales, all items agree with the attitudinal dimensions of MAS proposed by Garcia (2001). The reaction of learners to the multimedia application "Leonidas" was encouraging. Analysis of the survey revealed a generally strong positive attitude towards this particular multimedia application.

The finding was not a surprise given the learners' positive attitude toward the multimedia application but the level of positive reaction was higher than expected. The explanation in this phenomenon could be that participants in this study already had increased interest in Olympic issues. Factors that could have contributed in this were the multimedia experience of the participants with Olympic applications and their Greek origin. If this were the cases, it was also likely that some other group of learners were less favourable toward the multimedia application "Leonidas" of Athens 2004 training department. Also, the use of volunteers clearly had predisposed the learners towards more positive attitudes.

Further analysis of the survey showed that the first factor of the questionnaire "Individualized instruction" had positive ranging from "agree" to "strongly agree" for the majority of learners (76%). This reveals that participants found the multimedia application "Leonidas" as an individual and self-paced learning tool that allows them to work privately, in an enjoyable environment on their own. The factor "Self-paced instruction" had positive ranging from

"agree" to "strongly agree" in 78% of the learners. This indicates that the multimedia application "Leonidas" contained materials that allowed the learners to learn at their own pace, giving them a sense of control over learning. The third factor "Involvement" had the smallest positive impact on attitude of the multimedia application "Leonidas" ranging from "agree" to "strongly agree" in 53% of the learners. The explanation to this phenomenon could be that learners between the ages from 33-44 years old may need more sophisticated and complicated applications to have their work done. Another consideration could be that the learners were not satisfied with the amount and the clarity of information received. Also, participants found the learning experience in general worthwhile since the 90/% of the respondents rated the "General experience" questions by answering, from "agree" to "strongly agree". The fifth factor "Interaction" had positive ranging from "agree" to "strongly agree" in 68% of the learners. This means that the particular multimedia application contained interactive features that would empower the learners to control the content and the flow of information and encouraged them to be responsible for their own learning. Moreover, the factor "Learner's control" had positive ranging from "agree" to "strongly agree" in 73% of the learners. This indicates that the participants felt happy when they explored the multimedia application and they found out that they have to decide by themselves what needs to be done at every step, by exploring the activity in their own way. The seventh factor "Anxiety" had positive ranging from "agree" to "strongly agree" in 72% of the learners. This reveals that participants felt nerveless and comfortable when they studied lessons by browsing the material via multimedia application. Finally, the strong positive responses on the last factor "User-friendliness" made it the most dominant in increasing "Leonidas" attitude. This shows that participants found the multimedia application easy to use, all necessary special commands were clear and the user interface issues such as menu design and readability of screens had been addressed.

The research on how sex changes attitudes of the multimedia application "Leonidas" showed no significant differences. Males and females answered the questions of the survey the same way, indicating similar attitude. This suggests that using the multimedia application "Leonidas" has a positive effect for both sexes. Similar results have been reported by Antoniou, Patsi, Bebetsos & Ifantidou, (2006) and North and Noyes (2002), who found that the impact of psychological gender, does not influence significantly attitudes towards computers. Other researchers report that males have more positive attitudes than females (Bebetsos, Kouli & Antoniou, 2007; Ho and Lee, 2001; Schumacher and Moharan-Martin, 2001) or conversely finding that females liked computers more than males (Keasar, Baruch & Grobgeld-Dahan, 2005). Thus, the subsequent psychological gender theories of human–computer interaction (namely the socialization theory as applied by Whitely, 1997) are unsupported.

The fact that the gender differentiation has not occurred may be viewed on two levels. First, there may be a general cohort effect or second, there may be confounding factors exclusive to the sample group. In relation to the first point, the positive attitudes found in both males and females may be associated with changes in societal values and the socialisation processes in today's computer generation (Whitely, 1997). These are perhaps mediated by the impact of increased use of multimedia applications in organizations, at home and software developments improving multimedia applications interfaces. In other words the MCAI may no longer cultivate gender differences in multimedia applications attitudes per se. The second possible explanation for an absence of gender differences is that there may be some factors intrinsic to this sample group that were responsible. This overlaps with the previous idea of a cohort effect, e.g. it may be that the managers and the trainers at ATHENS 2004 organization were particularly keen to ensure all employees viewed multimedia applications positively and did not convey a gender bias.

The more detailed component analysis found that the attitude towards the factor "General experience" had a significant sex effect. This in part supports the suggestion by Whitely (1997) that gender effect exist on some attitude components but not others, which is fundamentally based on the assumption that adults hold bi-directional views about computers and especially multimedia applications. The fact that the females in this study viewed multimedia computing ability more impartially than males, may explain why they displayed positive attitudes in general about multimedia experience and why a significant difference was not found on other attitude components. In other words females did not accept the belief that multimedia computing was related to gender, mathematics background or nationality and viewed multimedia ability perhaps as an open option (Sanders, 2006). According to the socialization hypothesis, a greater acceptance of the belief that multimedia computing is inappropriate should be associated with more negative attitudes (Whitely, 1997). Since the females in this sample did not endorse the views that multimedia computing ability was related to sex then the absence of a sex difference on attitudes is not surprising.

Implications for practice

The use of multimedia technology in traditional classrooms has been growing at a rapid pace. Though many instructors are using various modes of multimedia technology to communicate with and instruct their learners, it is important to understand that these various modes affect not only learner acceptance and performance but also future behaviors in the learning process. This is a major concern because the cost of multimedia technology infrastructures continues to absorb an increasing percentage of organizations' budgets. Therefore, this study is timely and has several practical implications.

First, the findings reveal that the use of multimedia resources provides complementary learning activities that aid the learning process. There is great interest and potential in MCAI flexible learning with many instructors incorporating some form of multimedia technology as a part of their instruction in organizations training (Chandler, 2003). While instructors are the focal point in most course settings, it should be noted that complementary learning activities are just as important for practice, if not more so.

Second, the use of multimedia technology in organization training is a matter that not only the Organizing Committee for the Olympic Games ATHENS 2004 should be interested in, but also all the training organizations should benefit from the results of this study for further corporate planning. Furthermore, they should not only provide the opportunities of multimedia technology and MCAI for this organization but also they should take into consideration the experience other training organizations had in this area of study. They should take into consideration the attitudes of the employees on the uses of multimedia technology in organization and should prepare the courses required multimedia using for their learners. Because as the employees' success increases the success of the organization increases.

Third, using multimedia applications is time-consuming and labor-intensive, if productive outcomes are to be derived. Learners and instructors may find valuable resources and increased opportunities in communication through the multimedia technology, but at the expense of continuous effort and time consumption. Establishing an interactive and dynamic MCAI course like the learning environment of this study can help overcome time consumption difficulty, while providing learners with quick and convenient ways to find useful information. Multimedia applications create a much more interactive learning environment thereby increasing the effectiveness of learning.

Finally, a well-designed MCAI course provides the balance of real and virtual classrooms and class sessions. This ideally makes the class a more continuous environment rather than an environment, which is done in one or two hours and then set aside for the remainder of the week. Continuing education of employees can offer competitive advantages; field experiments within real-world organizations would be very useful to organizations already using interactive multimedia training to identify if their programs are effective and acceptable. For others, a field experiment might suggest if migration to self-paced instruction via interactive multimedia would be relevant and how it should be designed.

Limitations

As with all investigations, this study is not without limitations. First, the data used in this study were drawn from a single corporation sample. The organization is best described as a large, organizing committee for the Olympic Games located in Greece. Thus, the findings should be interpreted with caution and generalizations may only be relevant to organizations similar in size, control status, and corporation emphasis. The present study used self-report data and this may be another possible limitation. To the extent that respondents did not know the information being requested or found survey questions to be ambiguous and unclear, the generalizability of these findings may be limited.

Perhaps another limitation relates to the dataset used in the study — the MAS questionnaire. Perhaps, the attitude instrument of this study was limited to factors that could be defined or operationalized using items drawn from the database. It is highly possible that the MAS did not measure all of the variables needed to explain the variance in student self-reported attitude toward multimedia applications. Likewise, it is plausible that the MAS items have a marginal relationship with the constructs (e.g., Interaction, Learner's control, Anxiety, etc.) that they are purported to measure (Garcia, 2001).

Despite these limitations, this study contributes to our understanding of the potential effect of various uses of multimedia technology on learners' attitudes in training organizations. Specifically, it provided information about the association between employees' use of multimedia technology and self-reported attitude toward multimedia application "Leonidas". In addition, this research provides a foray into group differences that exist between males and females of multimedia technology.

Conclusion

In conclusion the learner's feedback from the questionnaires indicated a general level of satisfaction and contentment with this particular multimedia application. Yet, in order to have the learners make constructive and flexible use of the educational multimedia technologies, the "Individualized instruction", the "Self-paced instruction", the "Involvement", the "General experience", the "Interaction", the "Learner's control", the "Anxiety" and the "User-friendliness" seem to be crucial considerations. Perhaps, adherence to these basic principles will not only improve overall multimedia impressions, but also will increase use frequency to the multimedia application concerned. The scale adapted in the present study can be a useful tool for the evaluation of other relative multimedia applications by multimedia developers. Nevertheless, further examination is warranted in order to obtain additional information concerning the difficulties of multimedia experience on employees' attitudes toward multimedia applications.

When using multimedia technology in organization, it is strongly recommended that trainers take some time in assessing employees' attitudes toward multimedia technology prior to the structuring of instruction and its implementation in the training sessions. This approach is appropriate in that it ensures that the learners will have maximum gains in utilizing multimedia applications as a tool for learning. Furthermore, education managers will be given the chance to create an environment that can be conducive to the learners.

Research and development in this area will be continued with the view to refining any kind of multimedia educational environment so that it meets and full fills all expectations for supporting and enhancing employees learning process. More studies should be conducted to investigate the effect of multimedia experience on learner's attitudes toward the multimedia applications, especially when its effect is linked to gender. Also, one can reasonably assume that most people – regardless of gender, age, or other demographic factors – access multimedia application credibility in similar ways. Although real differences do exist, it's more striking to see how many things were not different, suggesting that the various demographic groups shared similar approaches to evaluating multimedia applications.

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