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Towards a Digital Pedagogy: The Educational Potential of Animation in Physical Education Teacher Preparation

Sarafoudi Ourania,

MSc,Physical Education Teacher, Lardos Primary School, Primary Education, Dodecanese Prefecture
raniasaraf@gmail.com

ABSTRACT

The purpose of this research was to evaluate the understanding of non-widespread activities and games in two different self-learning conditions: text and animation. In the survey, 93 (n = 93) physical education students from the undergraduate department of the Department of Physical Education and Sport Science of the DUTH, participated voluntarily, as potential physical education teachers, who had successfully completed the first two years of study and had received the appropriate pedagogical training. Students were separated randomly in two groups. The first team was asked to follow the traditional self-teaching method by reading a text that contained detailed instructions from the "robot race" game. The second group was invited to watch a cartoon movie with the same activity. The team of the text had 1min & 30sec available, while the cartoon group only once watched the film. The degree of understanding of the selected activity by the participating students was evaluated through a questionnaire which included 35 closed-ended questions. Through the statistical crosstabs chi-square analysis that was applied, it was found that there was a statistically significant difference between the two groups in terms of factors: title, materials, implementation environment, purpose, student security, restrictions and bans of action, with the animation team superior to the text group. In conclusion, we would say that the use of the animation method in understanding non-widespread activities leads to positive results.

Keywords: cartoons, animation, group physical activities, games, physical education teachers, self-learning.

INTRODUCTION

New technologies and their applications have a varied impact on every aspect of socio-economic and cultural activity in today's world (Siskos & Antoniou, 2006). They have penetrated into all areas of human activity as well as in the science of physical education. Animation, as a new application, dynamically makes them appear in the educational field.

Lifelong adult education is a necessity in the field of teacher education (Ministry of Education, Lifelong Learning and Religious Affairs, 2011). Continuing teacher training, which is necessary to improve the quality of teaching, is the subject of educational reforms. In recent years, continuous improvement and modernization of

teacher training tools is a matter of concern to those responsible in this field. Physical education teachers have at their disposal printed aids based on the traditional self-teaching method.

A new audiovisual technology, the use of animation, can enhance the training methods of Physical Education teachers. Animation is the quick view of images that create the illusion of movement (Wikipedia, 2016). The use of animation allows for a different approach to the standard self-learning mode by reading instructional texts and offers an alternative and more attractive method (Chatzigeorgiou, Vratsalis, Michailidou, Liarakou & Katsadoros, 2011). The information included in a large volume of textbooks could be given through the animation technology of particular interest through the visualization of the information, since, as reported by Chatzigeorgiou and co (2011), the transmission of information can be achieved in a smaller time compared to conventional methods. Cartoons are one of the most widespread types of art (Triantou, 2016). When people learn through art, a new perspective is attributed on the learning process (Houliara, Antoniou, Digelidis, Vernardakis & Kioulanis, 2013). The animation technology combines the art of moving images with the introduction of a new audiovisual technology in the learning process (Chatzigeorgiou et al, 2011).

New technologies offer a learning environment that is more attractive to trainees than the traditional learning environment (Vosniadou, 2006). Learning content can be enriched through the use of multimedia applications, as is animation. Initially, a better understanding of the data presented through multiple forms of representation of the same information is achieved while at the same time the participants have fun (Lapatoura, Fesakis, Papadatos & Skoubourdi, 2011). Chatzigeorgiou et al. (2011) report that animation can be used at every level of education as well as in adult education. Understanding the content of information presented in a cartoon film also leads to learning them, as understanding and learning are terms synonymous. (Wikipedia, 2017).

METHOD

Sample

The sample of the study consisted of 93 (n = 93) physical education students of the undergraduate department of SEFAA. of the Democritus University of Thrace, as potential physical education teachers. The students had successfully completed the first two years of study, so they had the appropriate pedagogical training. They were randomly assigned to two groups (n1 = 46 and n2 = 47), and their participation was voluntary.

Data Collection Process

The first group was asked to read a 285 word text containing detailed instructions for an unusual gaming activity. The selected activity was the "robot race". The text outlined the basic elements of the chosen activity (the traditional way), such as the title of the game, the necessary materials, the number of participants, the environment where the action can be implemented, the purpose of the game, the difficulty of preparing it, the degree of difficulty of performing the activity, the rules that are necessary for the implementation of the action, the limitations and the safety rules of the game. The time available to them was 1.30 min. A reader who is trained has the ability to read 200-300 words per minute, provided the text is relatively simple and not complicated (Grabe, 1999). The second group was invited to watch an animation movie (which was made

by us) where the same activity was shown using cartoons. They followed the cartoon film only once. The program scratch 1,4 was used to create the movie. The Corel draw X6 program was initially used to design each figure who participated in the activity. This was followed by the corel photoshop GS5 process. The open broadcaster software program was used to record conversations. The scratch program enables the production of interactive educational material, but in this research it was chosen not to have this option but only to watch the animated film. For this reason bandicam screen recorder was used to record the movie. Finally, windows moviemaker was used to create the original slide with the title of the movie, as well as to add sound background during the movie something that could not be incorporated into the scratch program. The degree of understanding of the selected activity by the participating students was evaluated through a questionnaire which included 35 closed-ended questions. In order to evaluate the reliability of the questionnaire, the test-retest method, over a four-week period, was applied to the same individuals to test the statistical correlation between the two scores. The values of the correlation coefficients ranged from $r = 0.674$ to $r = 0.844$. In order to check the validity of the questionnaire, the method of the known groups was used, where the extent to which the questionnaire distinguished the two groups (T.G-text group & A.G.-animation group) showed that they differ in some characteristic, so the questionnaire displayed a validity of conceptual construction (Galanis, 2013).

Statistical Analysis

The SPSS 20.0 statistical program was used for data analysis, while the statistical significance level was set at $p < 0.05$. For the existence of statistically significant differences between the two groups, an independence check was performed between two qualitative variables (PearsonChiSquare test).

FINDING

After the crosstabs chi-square statistical analysis applied, it was found that there was a statistically significant difference between the two groups, with respect to the factor ($x2 = 5.506$, df = 1, $p < 0.05$), (correct selection of A.G. 78.3% & T.G. 55.3%), 55.3% of those informed by reading the text with the guidelines chose the right answer, compared to 78.3% of those who were informed by watching the animated film.

A statistically significant difference between the two groups also existed for the factor materials (Fig. 1), namely for the "chair" material ($x2 = 19,831$, df = 1, $p < 0,05$), (correct selection of A.G. 91,3% & T.G. 48.9%), only 48.9% of those informed by reading the text with the instructions chose the correct answer (chair), while 91.3% of those informed by watching the animated film chose the right answer and for the "box" material ($x2 = 28,270$, df = 1, $p < 0,05$)), (correct choice of A.G. 97,8% & T.G. 48,9%) , 48.9% of those who were informed by reading the text with the instructions chose the correct answer (box) while 97.8% of those who were informed by watching the film of animation chose the correct answer.
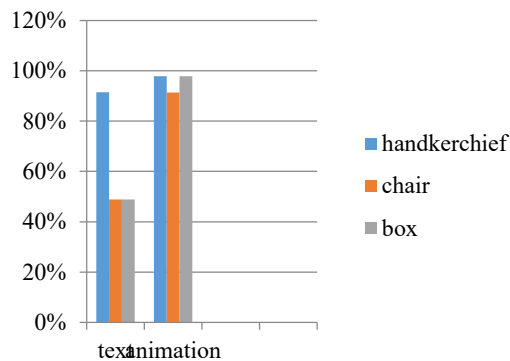
Figure 1. Comparison of ratios of choice of the necessary materials between the two ways of updating

As regards the selection of the "yard" and "stadium" variables concerning the environment of the action, a statistically significant difference between the two groups (Fig. 2) was found, namely for the choice of yard ($x2 = 17,504$, $df = 1$, $p < 0.05$), (correct choice of A.G. 100% & T.G. 68.1%), all who were informed by watching the animated film chose the correct "yard" response, and for the " stadium " option (the correct choice of A.G. 69.6% & T.G. 31.9%), the percentage that chose the correct "stadium" response of those who were informed by watching ($x2 = 13,183$, $df = 1$ $p < 0,05$) the movie cartoon is more than double than that of those who were informed by reading the text instructions (69.6% vs. 31.9%).
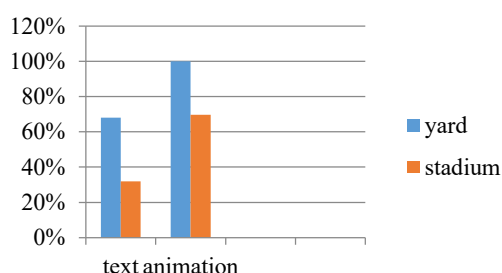

Figure 2
Compare activity-based selection between the two ways of updating

Regarding the agent's purpose of activity, a statistically significant difference was found between the two groups ($x2 = 30,648$, $df = 1$, $p < 0,05$), (correct selection A.G.71,7% & T.G. 14,9 %), the correct answer was chosen by 14.9% of those who were informed by reading the text with instructions and 71.7% of those who were informed by watching the animated film.

As for student safety factor, a statistically significant difference was found between the two groups ($x2 = 11,827$, $df = 1$, $p < 0,05$), (correct choice A.G. 95,7% & T.G. 68,1%), in particular, we notice that 68.1% of those who were informed by reading the text with the instructions and 95.7% of those who were informed by watching the animated film gave a good answer.

Concerning the restrictions and bans of the action, there was a statistically significant difference between the two groups for the selection "How long do players have to choose the keywords", ($x2 = 27,589$, $df = 1$, $p < 0 , 05$), (correct choice A.G. 93.5% &

T.G. 42.6%), correct matching made less than one in 2 (42.6%) of those who were informed by reading the text with instructions and almost all (93.5%) of those who were informed by watching the animated film.

Also, for the option "allowed to use numbers" ($x2 = 18,789$, df = 1, $p < 0,05$), (correct selection A.G. 95,7% & T.G. 57,4%)(table 3) a good answer was given by 57.4% of respondents who were informed by reading the text with the instructions and almost the whole (95.7%) of those who were informed by watching the animated film. And for the choice "it is allowed to use words that have the first letter the same as the word they encode" ($x2 = 9.571$, df = 1, $p < 0.05$), (correct selection A.G. 76.1% & T.G. 44.7%), a correct answer was given by 44.7% of respondents who were informed by reading the text with the instructions and 76.1% of those who were informed by watching the animated film.

DISCUSSION

The purpose of this study was to evaluate the understanding of non-widespread activities and games in two different self-learning conditions: text and animated images. More specifically, through a questionnaire, a check was made on understanding the basic elements of the "Robot race" group activity . The results of the research have shown that the use of alternative training methods such as the use of animation effectively influences the understanding of unusual group activities and games.

Digital technologies today offer a multitude of opportunities in a number of areas such as economy, politics, the arts, culture and education. Teachers should be able to use information technology in the educational process. It is necessary for the 21st century to continuously improve their professional capacity through innovative, flexible, creative and operational processes, in an ever changing environment, in order to maintain and increase their competitiveness. Animation can be used to teach different age groups from 6 years old to adult groups covering different educational areas. The need to integrate animation as a pedagogical process into teacher education is a reality as innovation in the educational process is the basis for adults' desire for knowledge, improvement of their skills and better professional performance. (Šteinberga, 2014). As mentioned by Kontakos and Govaris (2006), according to the Cross model, when adults act as trainees and pupils present differences from children, therefore adult teaching should be differentiated from that of children. One of the groups of variables that should be considered in adult education are learning conditions. In particular, the duration of adult education should be part-time, and the degree of commitment to education should be on a voluntary basis. According to the same model when adults are in a transition phase of their lives, then the most important learning opportunities take place. Besides, as reported by Selwyn, Gorard and Furlong, (2006), the use of computers strengthens the process of self-teaching.

The use of information technology can compensate for the possible inadequacy of the traditional method of teaching sports. As individuals watch cartoons, motion analysis is formed in their brain and then they have the desire to try in practice. Animation helps individuals not only to understand the technique of different sports but also to deepen in knowledge by acquiring more basic knowledge in a limited time. (Li & Zhang, 2014). This research strengthens this view by extending the use of the animation to unusual group activities such as the "robot race" game selected for study. Participating students who were invited to learn this game through watching the animated film showed positive results on most of the individual components composing the activity.

Characteristically, in some of them, such as the choice of "chair" and "box" materials, "if the robot is allowed to speak", "if the caller is allowed to speak", "if the caller is allowed to move" "Robot can not see", "the robot can hear but can not see or talk", "the time that players have at their disposal to choose the keywords", "if numbers are allowed", "who is responsible for the safety of pupils', the percentage of positive results exceeds 90%. Of particular interest is the fact that in selecting the "yard" variable in a question about the implementation environment of the action, all those informed by watching the animated film chose the right answer. The positive response reaches 100%, a result that is justified by the fact that the game in the cartoon film takes place in the school yard. It should be noted that the cartoon film used in this study was amateur, which further enhances the certainty of the positive performance of cartoons, since a more professional work might have even better results, a finding that requires further research.

The analysis of the results found that cartoons contribute positively to learning, as the power of the image seems to be very important. Baek and Layne (1988), who used graphics and animation to teach the average speed rule in a 20-minute lesson, arrives at a similar result. The results of the survey showed a statistically significant difference between the animation group and the group of the text.

In addition, Voskopoulou (2016) reports that cartoons are not only for students but also for older people a strong motivation for learning. Teachers and theorists agree that cartoons not only provide a narrative of a story but have the power to transfer knowledge. Besides, as Betrancourt (2005) says, animation offers a variety of learning opportunities.

In 2006, Antoniou, Moulelis, Siskos and Tsamourtzis in their research using a multimedia program for ski instruction concluded that when the teaching method is assisted by the use of multimedia, there is a more effective learning of the technique by the students who are beginners, but also an improvement of the men and women in performance. However, the results of the study of Antoniou, Derry, Kioumourtzoglou and Mouroutsos(2003) seem to not fully support this view. In particular, in their research, in order to examine the impact of multimedia use on rules violations in basketball sport, they compared three different teaching methods. The survey included 70 first-year students who were divided into three groups and attended five hours of teaching. The first group followed instructions through a multimedia program, the second group followed the traditional method and the third group followed a combination of the two previous methods. The results of the survey showed that although all students improved their knowledge, only the second and third groups retained their knowledge.

Students of Physical Education have shown a positive attitude and preference in choosing animation as a methodological tool for their training. A similar conclusion is reached by Emmanouilidou Antoniou & Derri, (2016), who in their research report that the participants find their modern computer-based training method pleasant and innovative. This view is reinforced by Thomas and Stratton (2006), who in their study on the importance of using new technologies in Physical Education concluded that Physical Education teachers not only see positive, but also consider the use of new technologies as a valuable tool for promoting effective sional teaching and learning.

CONCLUSIONS

This is an innovative research for Greece, as no such study has been conducted thus far as to the use of animation by Physical Education teachers as an alternative method of approaching non-widespread group activities, as well as their use in general by Physical Education Teachers. From the control of independence between two qualitative variables and from the study of the results of the research it was concluded that the use of cartoons contributed positively to the understanding of most of the individual components that make up the specific activity. These results are consistent with the results of other investigations, that the use of cartoons is a high quality educational material in the understanding of cognitive knowledge in various scientific fields. However, there are several studies that support the best results with the parallel use of traditional teaching and computer-based teaching methods. To summarize, more research is needed on this subject, which will be able to compare the impact of using cartoons on understanding not only non-widespread but also more complex group activities and games.

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