

The Impact of Globalization and ICT in Greek High School Physical Education

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Abstract: *The aim of this study was to investigate pupils' satisfaction and attitudes, towards a new frame of PE lessons in the high school classes. The majority of activities were cooperative kinetic games from around the world, global dances and impromptu theatrical events which were created by pupils with a little support of their PE teacher. Collaborative ICT tools were used throughout the research as the whole material has been integrated into a blog and a wiki. Both were used for asynchronous communication. The participants, during two school years, were 166 in total, Christians and Muslims, indigenous and non – indigenous from an upper Secondary urban school in Northeastern Greece. The questionnaire "satisfaction with the course of PE" was used for assessing satisfaction levels. To evaluate the attitudes in new PE objects and the method by which they were taught, scales were used adapted to the needs of this research, after having been measured by previous researchers and pilot tested on other students. The data analysis indicated that students of the experimental groups showed high performance in all the questionnaires and scales in the total score, compared with the control groups.*

Keywords: *kinetic games, dances, cooperation, social skills, ICT.*

I. INTRODUCTION

The Greek society stands at the beginning of a new era, where perhaps more than ever, the importance of addressing contemporary challenges to this dominant globalization, competitiveness, the use of information technology, multiculturalism and refugee crisis has been widely stressed (Kyridis, Christodoulou, Vamvakidou & Pavlis-Korres, 2015; Hirst & Thompson, 1999). Reflecting the Greek society, school is not anymore characterized by a cultural homogeneity (Derri, Kellis, Vernadakis, Albanidis & Kioumourtzoglou, 2014; Gropas & Triandafyllidou, 2011). Education of good quality can help develop citizens who are capable and mindful, which in turn improves their livelihoods and those of others around them. Not all education brings the same benefits to everyone. Time, place, situation and context matter (Unesco, 2016). The starting point of the learning process is the environment, experience and interests of the student (Backman & Larsson, 2016). Students are provided with the opportunity to reflect on their own values and attitudes, including their prejudices and stereotypes (Na, 2015). Students with different cultural backgrounds are invited to initiate lifelong exercise, the primary purpose in the Secondary level of PE (NASPE, 2012).

II. LITERATURE REVIEW

The new context of PE

PE plays a crucial part in all children education around the world. As far as contemporary PE is concerned, teaching sports and games is not the goal itself, but the instrument for teaching skills beyond the absolutely kinetic one (ICSSP, 2013). Curricula in developed Western countries integrate, in addition to teaching kinetic skills, skills to acquire psychosomatic health, life skills and values, and all these are pursued through interesting, enjoyable and fun activities, with meaning, for each student (ACHPER, 2012; NASPE, 2010).

Apart from ways to lead a healthy and active lifestyle, life skills like respect, ethics, tolerance towards diversity, problem solving, critical thinking and more are reflected into Greek PE curricula (Greek Ministry of Education and Religious Affairs, 2015). The PE subject aims at the opening in society through a focus on purely social issues such as violence, racism, gender relationships, different prejudices, positive relationship with our body, with others and the natural environment.

Physical education and ICT

In the Internet age, knowledge in recent years is increasing exponentially and cannot be passed on to students through the school system. Within such an environment, the school cannot remain attached to the traditional way of organization and operation. More than any other time it has changed from a closed, knowledge-based and teacher centred environment into a modern, open, experiential, learner-centred, and operative and research centre (Clark, Twining & Chambers, 2014; Gillespie, 2014).

PE, although as a subject deals with the physical movement, is a cognitive area where ICT can play an important role through the use of computers and appropriate educational software (Metwaly, 2016). In the United States, Australia and other countries students take distance courses or complementary to the "in person" subject in schools through a computer (NASPE, 2007).

In recent decades a growing number of PE teachers recognize the necessity of ICT integration in the course of PE, not only as feedback means of various techniques taught through video or level of physical activity and heart rate using pedometers (Crawford & Fitzpatrick, 2015; Papastergiou, Pollatou, Theofylaktou & Karadimou, 2014). The technology is changing the way we teach Physical Education - In Greece despite the technical problems related to the knowledge of teachers on the PC and the lack of software on this subject, it is possible to use digital pages in a collaborative and interactive spirit, such as blogs and wiki (Vercruysse, 2017; Papastergiou, Gerodimos & Antoniou, 2011). Moreover in recent years, digital games in addition to the strengthening of physical health develop academic and social skills (Staiano & Calvert, 2011).

Aim & Research Hypothesis

The aim of the research was the implementation of a new program with kinetic collaborative games, performances and dances of the world, whose trunk is primarily created by the children with the concomitant use of the PC to the lesson. In particular, the assumption was made that through the proper management of such a program and the integration of ICT in the educational process, it is possible to increase the satisfaction of participants from the course of PE and get a positive attitude towards the new teaching method. The significance of the research lies in the fact that the center of teaching shifted almost exclusively to the male and female student and the development of his / her personality.

III. METHODOLOGY

Action research

In this research, intervention in the form of research – action was applied (intervention - action research) in adolescent children. The flexibility of the research design was based on alternative circular patterns design; action, observation, understanding of students' participation in the school environment is placed in the course of research center and constitutes the main research purpose. At the heart of Research - Action, the active participation of children is studied and examined, whether they are willing to participate in activities, to take initiatives and responsibilities without close guidance of the teacher, whether they relate to the activities of the courtyard or the use of the ICT (Elliott, 1991)).

Participants

The survey lasted for two school years, 2013-14 and 2014-15, and involved a total of 166 male and female students in the first year of senior high school in a provincial city of Northeast Greece. 84 (50.6%) of them participated in the pedagogical intervention either the pilot or the main research and 82 in the control group (49.4%). Of these, 94 (56.6%) were female and 72 (43.4%) boys. 117 (70.5%) were Christians by religion and 49 (29.5%) Muslims, while 111 (66.9%) were indigenous and 55 (33.1%) non-indigenous.

Table 1: Distribution of students per group

	Control	experimental	Total
Pilot study	27	27	54
Main study	55	57	112
Total	82	84	166

The main experimental investigation consisted of 57 students separated into two groups in 1st year of High School; 28 students from class A6 and 29 students from class A7. Of these, 33 were girls (57.9%) and 24 were boys (42.1%), 41 Christians (71.9%) and 16 Muslims (28.1%) while on the nationality 39 (68.4 %) were Greek ethnic / nationals and 18 (31.6%) other nationalities / non-natives.

Table 2: Distribution of pupils by gender

		Girl	Boy	Total
Pilot study	control	15 (55, 6%)	12 (44 4%)	27
	experimental	15 (55, 6%)	12 (44 4%)	27
Basic study	control	31 (56, 4%)	24 (43, 6%)	55
	experimental	33 (57 9%)	24 (42 1%)	57
Total		94	72	166

Limitations

The participants of this survey were from a single senior high school in an urban area of a small town. However, pupils from surrounding mountain villages also attend school classes there. The PE teacher of the experimental groups was at the same time the researcher while the control groups were taught PE by another PE teacher.

Sources of funding of the study

This study was based on the authors' internal motives and the pupils' help. The authors tested new educational PE content and a new method to meet students' needs as "pupils" and "future citizens". The researcher - PE teacher was responsible for the construction of digital environments, research implementation and data collection. The pupils along with the PE teacher created the teaching content on their own and used their own devices. The other authors helped through their knowledge and support to review literature, data analysis and references. Therefore, this study was totally self-financed by the authors.

Measuring Tools

To control the attitudes and intentions of male and female students towards the course of PE the questionnaire of Ajzen was utilized, which adapts to the subjects and the purpose of an investigation (2002). The starting point was the Greek version (Theodorakis, 1994) of the "Questionnaire of Planned Behaviour" of Ajzen and Madden (1986). Specifically, scales adapted to the needs of this research were used, by applying pre-post and follow up, after being controlled by previous researchers and pilot tested to other students (Papaioannou & Theodorakis, 1996; Anthony, Theodorakis, Mouroutsos, Kioumourtzoglou, Taxildaris, 1996; Bebetos & Antoniou, 2011). The questionnaire of this research consists in its basic form of 16 questions that assess attitudes towards the course of PE: satisfaction with the contents of the course, the teaching method, the participation and cooperation of the participants. In addition, the internal interest and the intention of male and female students to engage themselves in such teaching experiences in the future or in adulthood were examined. The full form of the questionnaire was given only to the experimental group after the intervention (24 questions).

To detect participants' satisfaction the questionnaire "Satisfaction from the PE course" of Papaioannou, Milosis, Kosmidou & Tsigilis (2002) was used. Cronbach's α index has a value of 0.94, value corresponding to high internal reliability. The instrument was weighted and modified for the Greek population of this age from the original questionnaire of Duda and Nicholls (1992) and consists of a factor and five questions ("find the course/activity interesting", "had fun", "time flew by", "I liked the activity" and "I was fully dedicated to the activity"). Participants answered based on a five-point Likert-type scale (1 = strongly disagree, 5 = strongly agree).

Statistical significance

For all the results of the pilot and main research the defined rejection limit of statistical hypothesis was 0.05. As in each of the surveys more than one statistical analyses of variance methods (ANOVA) were applied, the rejection threshold for each of those was designated in accordance with the Bonferroni correction as the ratio of 0.05 with the number of applications of the method, set as: $\alpha = 0.05 / 6 = 0.0083$.

Implementation

The preparation phase mainly relied on literature search on the internet by students. Additionally, they attempted to obtain information concerning games, dances and activities of their hometown. Information from the family environment of the learners was also used. Just before practice, digital spaces were selected and some initial indicative options were made. While for the pilot study a blog was selected as an area of cooperation and communication, in the main study it was good to build a more collaborative environment to demonstrate the similar operation and utilization of the teaching practice, a wiki type called wikispaces.

The participants were required to suggest their own games and dances and the role of the PE teacher was simply advisory. Once or twice a week students posted before the lesson, and afterwards. The posts together amounted to a large number, 110 and 170 in the pilot and main research respectively. In any technical difficulty, students were provided with direct aid from the PE teacher or more experienced peers at site via texting and closed group on a social network.

Intervention Contents

The individual objects of the PE, sports, gymnastics, fitness and dance, were used to design and to highlight issues on the acceptance of diversity and peaceful coexistence of all people in the current multicultural school environment (Pavlidou, Arvanitidou & Chatizigeorgiadou, 2012) Examples of these activities were various ritual dances of Native Americans and the African continent, games from different regions and improvised simulations related to global problems, such as the various wars, social injustice, child labour, poverty, inequality and exploitation of natural resources by man. For example, half the students of a class were asked to imagine, plan and present during the course, passing in football in a village next to the river Nile, without giving them any ball. The other half were asked to present this specific skill in a private US school, and all available balls were given. Another group of students played basketball without shoes on the winning occasion of a poor team from Mexico which was playing barefoot.

Data collection process

Before intervention

In the pilot study there was no questionnaire before the intervention. In the main research 'satisfaction questionnaire from PE' was completed before the start of the intervention both by experimental groups and the control groups to reflect the satisfaction of last year PE in junior high school. The attitudes questionnaire was

also given to the entire sample with 16 questions only which did not cover new teaching contents which were subsequently applied.

After the intervention

Immediately after the educational intervention all questionnaires were given to the entire sample of both surveys. The questionnaires were distributed into test immediately after the intervention and completed indoors in the presence of the PE teacher. The attitudes questionnaire was enriched with more questions only for experimental groups. Similarly, they were supplemented by the control groups' presence of a PE teacher who was responsible for the course according to the official curriculum for PE, in consultation with the researcher.

Follow up measurements

In the beginning of the new school year, 2015-6, in October, satisfaction questionnaires and attitudes - intention were given to experimental groups of the main research to control and maintain the results.

IV. STATISTICAL ANALYSIS

Satisfaction questionnaire

Because the responses of students to the questionnaire satisfaction Papaioannou, Milosis, Kosmidou & Tsigilis (2002) were not ordinal, a variance analysis (ANOVA) cannot be used. This method assumes that the variables are continuous and that they follow the normal distribution. Instead of this, the non-parametric method of Mann - Whitney, in which observations are replaced by their rank, was used. Depending on the comparison between repeated measurements in the experimental group the nonparametric method Friedman was used, which does not support the investigation of factors.

To make it possible to investigate the factors affecting the students' responses, it was considered necessary to calculate and use the general satisfaction index (GSI) as the average of students' responses to five specific questions. The validity of the above rule is justified by the common finding in the literature that the internal reliability satisfaction questionnaire, as represented by the index α -of Cronbach, is very high, which is confirmed by this investigation, both for measuring before the intervention ($\alpha = 0.882$, $N = 112$) and thereafter ($\alpha = 0.937$, $N = 111$). Moreover, the principal components analysis (Principal Components Analysis, PCA) points to the fact that the satisfaction scale is one-dimensional, which further supports the validity of the GSI as a measure of student satisfaction, as expressed by the questionnaire satisfaction Papaioannou, Milosis, Kosmidou & Tsigilis (2002).

To detect the influence of the factors "sex", "nationality" and "religion" on the satisfaction of the students, as expressed by the General Satisfaction Index (GSI), analysis of variance was applied with multiple measurements (Repeated Measures ANOVA). The conditions of this process are (a) the regularity of value distribution of the dependent variable in each of the measurements (and between independent groups if any), (b) the homogeneity between independent groups (if any) (c) absence of singular and / or extreme values (outliers - extreme values) (d) the standard deviation among all the differences of measurements and combinations of groups (if any) does not differ statistically (sphericity of observations).

For each statistical correlation or interaction concerning statistical significance, as well as the partial index η^2 (Partial Eta Square), in which is expressed the influence factor or combination of factors on the dependent variable.

General Satisfaction Index

To investigate the number of latent variables (latent variables) contained in the satisfaction questionnaire the method of principal components analysis was used (PCA). The method was applied to all the students who completed the questionnaire before and after the educational intervention for both the pilot and the main survey.

In both applications there was found to be a main factor which explained 85.1% and 68.4% respectively of the total variability and the corresponding eigen value of 4.255 and 3.421 respectively. This result is represented visually by the chart of eigen values (Figure 1).

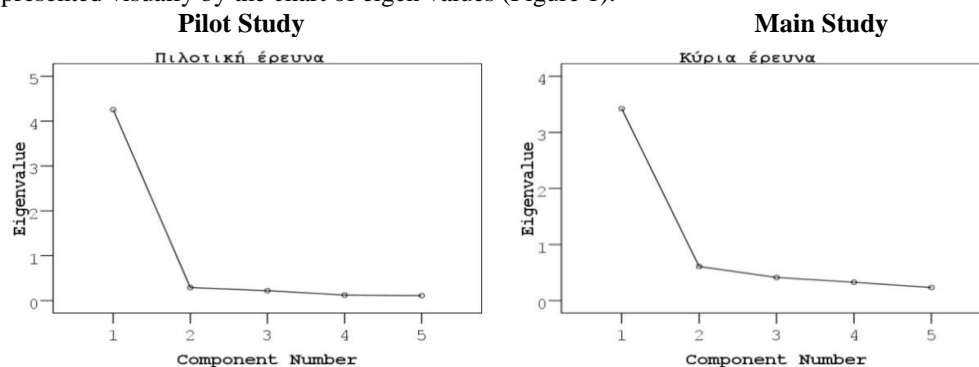


Figure1: PCA Eigen values Component

The definition of the general satisfaction index (GSI) was expressed as the average of students' responses to five specific questions in each of which the coding (1 = strongly disagree to 5 = strongly agree) was used, namely:

$$GSI = ("find\ the\ course/activity\ interesting" + "had\ fun" + "time\ flew\ by" + "I\ liked\ the\ activity" + "I\ was\ fully\ dedicated\ to\ the\ activity") / 5$$

The students sample pilot survey found an average value of 3.3 and a standard deviation of 1.1, while the main survey found an average value of 3.2 with a standard deviation of 0.7. The breakdown of values shows that there is significant difference from the normal distribution in both the pilot and the main research in the control group and the experimental group.

Attitudes questionnaire

The attitudes questionnaire consists of 13 questions to which answers match Osgood type seven grade scales from completely "agree" to "I have no opinion". These responses matched the numbers 6 to 0 and the resulting sum is the ultimate method of evaluation index, which can range from 0 to 78. The attitudes questionnaire showed high reliability both in the pilot study ($\alpha = 0.988$, $N = 54$) and in the main survey before the intervention ($\alpha = 0.896$, $N = 111$) and after the intervention (0.979 , $N = 112$) confirming previous scale applications.

To compare repeated measurements in the experimental group, the nonparametric method Friedman was used.

To detect the effect of the agent 'Sex' on the development of attitudes to physical education of students who participated in the experimental method, generalized prediction equations (Generalized Estimating Equations) were applied. A new bivalent variable was created for each question, where the responses "strongly agree", "agree" and "rather agree" were defined as "agreement" with a value of 1 while the responses "strongly disagree", "disagree" and "rather disagree" were defined as "disagree" with value 0.

Evaluation of attitudes towards teaching methods

To investigate attitudes towards the teaching method, multicultural kinetic cooperative games and world dances, two ranges consisting of six subjects each were used. Each scale separately evaluated the participation in the program and the attitude in the method by which each group was taught the Physical Education course. These scales have been used in the past for the same purpose in similar operations (Antoniou et al, 1996). For this study the same scales were used in a modified phrase concerning the curricula object. The internal reliability index (Cronbach α) was 0.618 ($N = 57$). A total of six pairs of adjectives: good - bad, stupid - clever, useful - useless, repulsive - attractive, ugly - beautiful, unpleasant - pleasant.

On the scale for the evaluation of participation General Participation Assessment Indicator was appointed as the sum of individual responses, while on the scale for the assessment of attitudes towards the teaching method General Evaluation Index of Teaching Method was appointed as the sum of the individual responses.

Internal interest and intent evaluation

To evaluate the internal interest and intent for future engagement with kinetic intercultural/multicultural cooperation games and world dances the following questionnaires were used: The questionnaire "Internal interest" which was developed by Eccles, Adler & Meece (1984), amended by the Greek Papaioannou and Theodorakis (1996) and used for similar purposes in (Antoniou et al, 1996) and consists of two parts. The answers to each section correspond to an Osgood type seven grades scale "interesting" to "boring" and rated by 7 to 1, respectively. The sum of the responses was the final internal interest rate, derived from the teaching method, out of $2 \times 7 = 14$.

V. RESULTS

Satisfaction - Pilot survey

Table 3 presents some descriptive statistics of the General Satisfaction Index for the sample of the pilot survey. It shows a variation of satisfaction in the experimental group compared with the control group.

	N	Minimum	Maximum	Average	SD
experimental group	27	3.6	4.8	4.3	0.4
Girl	15	3.6	4.8	4.4	0.4
Boy	12	3.6	4.6	4.2	0.4
Control team	27	1.2	3.8	2.4	0.7
Girl	15	1.4	3, 8	2.4	0.7
Boy	12	1.2	3.6	2.3	0.7

To detect the influence of the factors "group", "sex", "nationality" and "religion" to the satisfaction of students as expressed by the General Satisfaction Index (GSI) analysis of variance (ANOVA) was applied

.There is a significant effect of group on satisfaction values ($F(1, 38) = 110,6, p < 0.001, \eta^2 = 0,744$). From Figure 2 it is evident that the experimental group had a statistically significant increase in GSI than the control group.

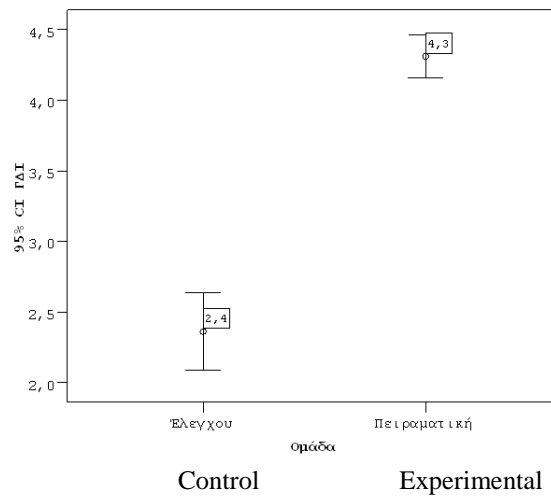


Figure 2: Comparison of the groups in the GSI

Furthermore, there wasn't significant interaction of religion and ethnicity with satisfaction respectively ($F(1, 38) = 5,299, p = 0.027 > 0,0083$), and ($F(1, 38) = 0,264, p = 0.610$).

Satisfaction - Main Research

To detect the influence of the factors "time", "Group", "sex", "nationality" and "religion" to the satisfaction of the students, as expressed by the General Satisfaction Index (GSI), analysis of variance was applied with multiple measurements (Repeated Measures ANOVA).

As GSI is a continuous quantitative variable in our sample it did not show extreme values, as all observations of the three measurements are within a maximum of 3 standard deviations from the mean value. In addition, by observing the frequency histograms, it can be seen that the regularity of the distributions is acceptable (Table 4). The homogeneity of observations among all values of gender factors, religion and nationality, was confirmed by the Box test, where the null hypothesis is verified, that the list of covariates is identical between all combinations of the factors rates, case which is not rejected by our data ($\text{Box } M = 49,047, F(30; 1314,1) = 1,314, p = 0,120$).

Table 4: General Satisfaction Index (GSI)

	N	Minimum	Maximum	Average	SD
experimental group	57				
Before intervention		2.0	4.2	3.2	0.6
After the intervention		3.8	5.0	4.5	0.3
Control team	55				
Before intervention		1.2	4.8	3.1	0.8
After the intervention		1.8	3.4	2.5	0.4

A significant effect of the time factor to the satisfaction values ($F(1, 96) = 18,186, p < 0.001, \eta^2 = 0,159$) is found, which is due to and interpreted by a significant interaction effect of time and group attended by the student (control or experimental) satisfaction value ($F(1, 96) = 98,1, p < 0.001, \eta^2 = 0,505$). The experimental group showed a statistically significant increase in GSI compared to the control group. No significant interaction of time factor, gender ($F(1, 96) = 0,345, p = 0,558$), religion ($F(1, 96) = 0,264, p = 0,609$) and citizenship ($F(1, 96) = 0,087, p = 0,768$) was detected.

Before educational intervention, students in the experimental group ($N = 57$) expressed responses which did not differ significantly from the responses of the students in the control group ($N = 55$). However, after the intervention the experimental group showed statistically greater values in the set of five questions (Table 5).

Table 5: Variations before and after the educational intervention (Main Research)

		Control (N = 55)	Experimental (N = 57)	P
I find the course/activity	Before	3,7 ± 1,0	3,8 ± 0,8	0.866

interesting	After	2,8 ± 0,8	4,6 ± 0,5	<0.001
	Before	3,4 ± 0,9	2,7 ± 0,8	0.705
I liked the activity	After	3,4 ± 0,7	4,5 ± 0,6	<0.001
	Before	3,0 ± 0,9	2,9 ± 0,6	0.465
I was fully dedicated to the activity	After	2,3 ± 0,8	4,4 ± 0,7	<0.001
	Before	3,1 ± 1,1	3,1 ± 0,8	0.822
I had fun	After	2,6 ± 0,8	4,5 ± 0,5	<0.001
	Before	2,5 ± 1,0	2,8 ± 0,8	0,055
Time flew by	After	2,3 ± 0,6	4,5 ± 0,5	<0.001

Attitudes Questionnaire - Pilot survey

The General Agreement Index was defined as the sum of the responses to 13 questions that constitute the questionnaire of students' attitudes. This sum may have a minimum value of 0 and a maximum of 78.

In the pilot study, the General Agreement Index ranged before the intervention of 3-74 units at an average value of 18, 6 (SD = 8,3) and 95% confidence interval (CI) of 15.3 to 21.9. After the educational intervention, the CPI ranged 35-74 units, averaged 58.6 points (SD = 10, 1) and 95% confidence interval (CI) of 54.6 to 62.6.

To detect the influence of the factors "group" and "sex" to the students' agreement as expressed by the General Agreement Index analysis of variance (ANOVA) was applied (Table 6)

Table 6: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	22202,083 (a)	3	7400.694	96332	,000	,853
Intercept	79104.675	1	79104.675	1029.674	,000	,954
Type	20549.556	1	20549.556	267485	,000	,843
Gender	8008	1	8008	104	,748	,002
type * gender	594075	1	594075	7733	,008	134
Error	3841.250	50	76825			
Total	106316.000	54				
Corrected Total	26043.333	53				

a R Squared =, 853 (Adjusted R Squared =, 844)

It was found that there is a significant effect of group on the agreement values ($F(1, 50) = 267, 5, p < 0.001$, the $p = 0,843$). The experimental group had a statistically significant increase in agreement compared to the control group. Regarding gender, there was no significant differentiation ($F(1, 50) = 0,104, p = 0,748$). Moreover, there was a significant interaction of group and gender to satisfaction value ($F(1, 50) = 7,733, p = 0.008 < 0, 0083, \eta^2 = 0,134$). This interaction is interpreted from table 10, where it can be seen that the girls' control group had less agreement than the boys while the reverse was the case in the experimental group, indicating that the program was received with greater satisfaction among girls than boys, which may justify the greater acceptance of the dances object by the girls as opposed to boys who were not motivated by their dances, while traditionally involved much more than girls in the typical lesson (Fisette, 2013; Biddle, Braithwaite & Pearson, 2014; Smith, Lounsbury & McKenzie, 2014).

Attitudes Questionnaire - Main Research

In the experimental group before the intervention, the General Agreement Index ranged from 15-51 units with average 34,5 (SD = 8,2) and 95% confidence interval (CI) of 32.3 to 36.7. After the educational intervention, the CPI ranged from 61-73 units, averaged 67.3 points (SD = 3,2) and 95% confidence interval (CI) of 66.5 to 68.2, while the repetitive measurement of the variation index which was 43-72 units, averaged 60.8 points (SD = 6,0) and 95% confidence interval (CI) from 59.2 to 62.3 points. The homogeneity of observations between the agent 'Sex' is confirmed by the test Box values on which the null hypothesis is verified that the table of covariance is the same among all the factor value, hypothesis accepted by our data (Box M = 13,766, $F(6; 16982, 1) = 2,151, p = 0,045$), having statistical significance of less than 0.05 and not less than the lower limit of 0.01 rejection. The condition of sphericity was rejected ($W = 0, 492, \chi^2(2) = 37, 556, p < 0.001$) and for the interpretation of results we will use the correction by Huynh - Feldt in which the leading index corresponds e (0, 686). It was found that there is a significant effect of the time factor in the GAI values ($F(1,$

372; 7, 107) = 545, 5, $p < 0.001$, $2 = 0.910$), while there was no significant interaction of time factor and gender ($F(1,372; 74,107) = 1,254$, $p = 0, 280$).

To clarify the difference between the three measurements the test t - test was applied for paired observations unilaterally taking control as the null hypothesis rejection threshold ($0.05: 3$): $2 = 0.008$. It was found that the three measurements have statistically significant differences between them, namely the General Agreement indicator before the intervention is statistically less than the measurement after the intervention ($t(56) = 40,558$, $p < 0,001$) and the iterative measurement ($t(56) = 19,401$, $p < 0,001$) and the agreement index of iterative measurement is statistically lower than the measurement after intervention ($t(56) = 7,376$, $p < 0,001$) (Table 7)

Table 7: Comparison of GAI among the three measurements (experimental group)

General Agreement Index (GAI)	M	N	SD	P
Before intervention	34.5	56	8.2	<0.001
After the intervention	67.3	56	3.2	
After the intervention	67.2	57	3.2	<0.001
Repeat measurement	60.8	57	6.0	
Before intervention	34.5	56	8.2	<0.001
Repeat measurement	60.8	56	6.1	

There was, however, significant difference between the two sexes ($F(1; 54) = 10,708$, $p = 0, 002$, $2 = 0.165$). Before the intervention the two populations were homogeneous ($t(54) = 1, 841$, $p = 0,071$), as the same thing happened after the intervention ($t(55) = 1,605$, $p = 0,114$), while at the iterative measurement girls expressed statistically higher agreement than boys ($t(55) = 3,073$, $p = 0,003$), which is probably explained by greater compatibility of content intervention with the general interests of girls compared to those of boys and by the fact that the researcher was a woman, and perhaps to some extent the proposals affected the choices of male and female students in the choice of objects. Moreover, probably the expectation of repeating the process in the future accounted for the more positive attitude of the girls with the passage of time which is reflected in the re-measurement.

To investigate the differentiation of attitudes of students across the course of PE before and after the educational intervention the nonparametric method Friedman was applied. The results are shown in Table 8.

Table 8: Method Friedman

	Student response (Mean Rank)			N	χ^2	df	P
	Before	After	Repetition				
This course was well organized	1.09	2.54	2.38	56	81699	2	<0.001
The objects effectively seize the time	1.09	2.65	2.26	57	90.01	2	<0.001
The lecturer presented the new items in a clear and understandable way	1.03	2.61	2.37	57	99189	2	<0.001
The aims of the course were achieved	1.03	2.62	2.35	57	96,745	2	<0.001
The gained knowledge was many	1.07	2.64	2.29	57	93407	2	<0.001
The gained knowledge combined theory with practice	1.03	2.60	2.36	48	79269	2	<0.001
Our program made me think creatively	1.02	2.61	2.37	47	80.8 63	2	<0.001
Our program has enabled us to develop collaborative skills	1.01	2.65	2.34	48	83083	2	<0.001
The program was completed with a pleasant and nice way	1.04	2.57	2.39	57	93,000	2	<0.001
Generally the program was beneficial for us	1.07	2.60	2.33	57	87838	2	<0.001
Generally teaching was pleasant	1.00	2.53	2.47	50	83899	2	<0.001
Generally there was development cooperation among students	1.00	2.60	2.40	57	98680	2	<0.001
For me to participate in the PE lesson is important	1.04	2.49	2.46	56	89469	2	<0.001
For me working with my classmates during the course of PE is ...	1.10	2.54	2.36	57	84471	2	<0.001
I intend to participate in the course of PE	1.09	2.51	2.40	57	85319	2	<0.001
I am determined to with my classmates in the course of PE	1.10	2.53	2.38	57	88231	2	<0.001

Table 8 confirms that the attitudes of male and female students across the PE course were improved after the educational intervention. That satisfaction was maintained along iterative measurement and this improvement is statistically significant at a confidence level of 0.001.

To detect the effect of the factor 'Sex' in the development of attitudes to the course of the PE of students who participated in the experimental group as expressed by each question separately, the method applied generalized prediction equations (Generalized Estimating Equations). Each question was transformed into a new bivalent variable where responses "strongly agree", "agree" and "rather agree" were defined as "agreement" with a value of 1 while the responses "strongly disagree", "disagree" and "rather disagree" were defined as "Disagree" with value 0 (Table 9).

Table 9: Generalized Estimating Equations

	Factor "Sex"		P
	Wald	df	
This course was well organized	0.187	1	0.666
The objects effectively seize the time	2384	1	0,123
The lecturer presented the new items in a clear and understandable way	0.113	1	0.737
The aims of the course were achieved	0,022	1	0.881
The knowledge gained was many	0.953	1	0.329
The knowledge gained combine theory with practice	1666	1	0.197
Our program made me think creatively	1,035	1	0.309
Our program has enabled us to develop collaborative skills	0,215	1	0.643
The program was completed with a pleasant and nice way	2,065	1	0,151
Generally the program was beneficial for us	2549	1	0.110
General teaching was pleasant	1,028	1	0.311
Generally there was development cooperation among students	0.861	1	0,354

We observe that there is no difference in the development of students' responses for the factor "Sex" (Table 9).

General Participation Assessment Indicator as it was defined as the sum of individual responses ranged from 30-39 units at an average price of 34.6 and standard deviation of 2,1 (95% CI 34,1 eos 35.2) while the up measurement ranged from 30 to 41 units with an average value of 34.1 and a standard deviation of 2,6 (95% CI 33,4 34,8 up) In the retreatment measuring the internal reliability index (Cronbach a) was 0.618 (N = 57). (Table 10)

Table 10: Participation General Evaluation Index

	Sex	Average	Typ.Divergence	Host
After the intervention	Girl	34.9	2.1	33
	Boy	34.2	2.1	24
	Total	34.6	2.1	57
Repeat measurement	Girl	35.0 (+ 0.3%)	2.8	33
	Boy	32.9 (-3.8%)	1.8	24
	Total	34.1 (-1.4%)	2.6	57

To investigate the correlation of the time factor in the students' gender analysis of variance with repeated measures (Repeated measures ANOVA) was applied.

The homogeneity of observations between the agent 'Sex' is controlled by the test Box values on which the null hypothesis is verified that the table of covariance is the same among all the factor values, hypothesis accepted by our data (Box M = 11,399, F (3; 216792, 3) = 3,645, p = 0,012) having statistical significance of less than 0.05, but without exceeding the minimum level of 0.01.

No significant influence of the time factor appeared in the Participation General Evaluation Index values (F (1, 55) = 4,348, p = 0,042 > 0, 0083), and accordingly there was no significant interaction of time factor gender (F (1, 55) = 4,791, p = 0,033 > 0, 0083). Finally, there was no significant effect of gender on the GDAS values (F (1, 55) = 7,009, p = 0,011 > 0, 0083).

From the above we can conclude that the kinetic multicultural games and world dances which where the main objects of pedagogical intervention improve students' attitude.

Attitudes towards the method

General Evaluation Index of Teaching Method as it was defined as the sum of individual responses ranged from 32-40 units at an average price of 35.6 and standard deviation of 2,3 (95% CI 35 to 36.2) and in the re measurement ranged from 31 to 39 units with an average value of 35.2 and a standard deviation of 2,1 (95% CI 34,6 up 35.7).The slight drop in the average value shows statistically significant (t (56) = 1,399, p = 0,167). For retreatment measuring the internal reliability index (Cronbach a) was 0.318 (N = 57), inadequate size which may be due to the small sample size from which it was calculated and is known to affect the reliability of the calculation of this index (Table 11).

Table 11: General Evaluation Index of Teaching Method

	Sex	Average	Typ. Divergence	Host
After the intervention	Girl	35.8	2.3	33
	Boy	35.3	2.2	24
	Total	35.6	2.3	57
Repeat measurement	Girl	35.5 (-0.8%)	2.2	33
	Boy	34.7 (-1.6%)	1.9	24
	Total	35.2 (-1.1%)	2.1	57

To investigate the correlation of the time factor in the students' gender analysis of variance with repeated measures (Repeated measures ANOVA) was applied.

The homogeneity of observations between the agent 'Sex' is controlled by the test Box values where the null hypothesis was verified (Box M = 0,635, F (3; 216792, 3) = 0,203, p = 0,894).

It was found that there is no significant effect of the time factor in the General Evaluation Index of Teaching Method values (F (1, 55) = 2,245, p = 0,140), and in addition there was no significant interaction of the time factor gender (F (1, 55) = 0,601, p = 0,442), nor variation between the two levels of "Sex" agent, (F (1, 55) = 1,666, p = 0,202)

Rating internal interest and intent

Following citations (Papaioannou and Theodorakis, 1996), two variables were created. The first variable was named "Internal interest" and was defined as the sum of the responses to the questions "In general, to participate in similar courses PE is" and "How do you like kinetic collaborative games and World dances?" The second variable was named "Intention" and defined as the sum of four questions answered in the seven grade scale Osgood "definitely yes" to "definitely not" as rated by 7 to 1, respectively. The final sum is the ultimate indicator of intent for future involvement with games and dances with a minimum possible rate of 7 and maximum rate of $4 \times 7 = 28$.

Internal interest

The internal interest ranged from 9 to 14 units with an average value of 11.8 and a standard deviation of 1,2 (95% CI 11,5 12,2 up) and at follow-up measurement ranged from 10 to 12 units with an average value of 12.2 and standard deviation of 1,2 (95% CI 11,9 12,5 up) (Table 12).

Table 12 : Internal Interest

	Sex	Average	Typ. Divergence	Host
After the intervention	Girl	11.7	1.2	33
	Boy	12.0	1.2	24
	Total	11.8	1.2	57
Repeat measurement	Girl	12.2 (+ 4.3%)	1.1	33
	Boy	12.3 (+ 2.5%)	1.3	24
	Total	12.2 (+ 3.4%)	1.2	57

To investigate the correlation of the time factor in the students' gender analysis of variance with repeated measures (Repeated measures ANOVA) was applied. The homogeneity of observations between factor values "Sex" is controlled by the test Box where the null hypothesis was verified that the table of covariance is the same among all the factor values, hypothesis which is not rejected by our data (Box M = 0,417, F (3; 216792, 3) = 0,133, p = 0,940).

It was found that there is no significant effect of the time factor to the values of the Rules of Interest (F (1, 55) = 3,449, p = 0,06), and in addition there was no significant interaction of the time factor gender (F (1, 55) = 0,291, p = 0,579), nor variation between the two levels of the agent "Sex", (F (1, 55) = 0.568, p = 0.454).

It is characteristic that the increase in Internal Interest of the students in the experimental was not marginally statistically significant by ANOVA method, however, the opposite is true of the test t - test repeated measurements (t (56) = 2,048, p = 0,045), which is interpreted as the possible existence of a genuine dispute but which remains to be confirmed in future research on a larger sample from this work, and which demonstrates the long-term benefits of the application of similar methods in the educational process.

Intentions about future involvement in games and dances

After intervention the intention ratio ranged from 20 to 28 units with an average value of 23.3 units and standard deviation of two points (95% CI of 22.8 to 23.9) and the repetitive measuring the ratio ranged from 20 to 27 units average 24.3 points and a standard deviation of 1.7 points (95% CI of 23.8 to 24.7)

To investigate the correlation of the time factor in the students' gender analysis of variance with repeated measures (Repeated measures ANOVA) was applied. The homogeneity of observations between factor rates "Sex" is controlled by the test Box where the null hypothesis was verified that the table of covariance is the same among all the factor rate, hypothesis which is not rejected by our data (Box M = 2,640, F (3; 216792, 3) = 0,844, p = 0,469).

As a comparison occurs between two measurements, the concept of sphericity of observations is not required, nor defined. It was found that there is a significant effect of the time factor in the values of futures Intent ($F(1, 55) = 8,451, p = 0,005 < 0,0083$), while there was no significant interaction of time factor gender ($F(1, 55) = 0,029, p = 0,866$), nor variation between the two levels of the agent " Sex », ($F(1, 55) = 2,559, p = 0.115$). An increase in intention is evident while similar behaviour exists in both sexes without differentiation between them which might be high enough to be considered statistically significant.

VI. CONCLUSIONS AND DISCUSSION

The aim of the study was the implementation of a PE program with new objects, enriched with cultural elements, which focused on the participation, development of cooperation and initiative, and the evaluation of pupils' satisfaction and attitudes/intention. According to the results of statistical analysis, pedagogical intervention improved students' satisfaction of the course and improved their attitudes towards the PE course. The proposed activities and the ICT lead to these results.

Kellis, Vernadakis, Albanidis, Derri and Kourteses (2010) in a survey of primary Greek schools noted that the activities associated with the culture of children of different cultural origins, contribute to their participation in class and in their pleasure, while improving confidence and their collaborative skills. Something similar can be observed in this investigation, namely students in previous years did not participate in the PE while now participate with satisfaction and suggest games and dances that are closer to the interests, temperament and culture. Even in high school surveys it was shown that the teaching of global culture is not adversely viewed by the majority of students (Walseth, 2013; Patterson, 2012). The significant variation of the experimental groups as opposed to control groups after the intervention is perhaps a criterion for the implementation of similar programs in high schools, attended by students of different cultural background and religion.

Overall, the newly created teaching material, maintained in an electronic folder (portfolio) on a website from which to teach individual subjects or the creation of learning scenarios additionally created extra source material. Also, the same area was exploited for interaction of male and female students with the content, communicating with each other and with the researcher.

Recommendations

Activities that inspire respect and understanding towards each cultural group, when societies change composition and texture, would be recommended to become part of formal and organized PE programs. The contents of the course would benefit from being enriched with objects that meet the needs of all students, of larger or smaller minorities, in order to encourage active participation and bring about satisfaction (Gibson, 2012; Patterson, 2012). With the increasing diversity in our schools, teachers must attempt to provide environments where students do not feel threatened or uncomfortable learning amongst students of different ethnicities. Again, teachers need to be open to listening to what their students are saying and feeling. The ultimate outcome of breaking down the cultural barriers may be producing a society that works together in future endeavours (Patterson, 2012).

Such programs are likely to respond positively to indigenous Muslims (Roma - Gypsies, Pomaks, of Turkish origin) and non-indigenous Christians (repatriates, expatriates). These require further investigation in terms of sociology to reveal those factors and make similar associations with activities that lead to this type of behaviour.

The use of PC could be made on a permanent basis for the PE course. The same students' behaviour shows that in collaboration with the PE teacher they can form their own knowledge repository and integrate functionally in the individual sections of the PE. Such an undertaking can be particularly time consuming for the PE teacher; however the gains in cognitive, emotional and social levels, for teachers and learners, are numerous and diverse.

To achieve this, it is legitimate to train in ICT and the established participation in online learning communities, so the technology apart from information and communication means could become an effective educational tool and a means of feedback and motor development, emotional and social skills.

Directions for Future Research

A larger sample would be useful to be used in future researches, in order for the pleasure of PE courses and the participants attitudes towards PE in high school classes to be further investigated. In this case, we can safely generalize results. Additionally, more schools of different areas could take part in similar studies. Finally, apart from quantitative research tools, new qualitative ones may contribute to research aims.

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