Teaching Local History, Culture, Traditions, and Customs Using Digital Games: Preliminary Results from a Case Study in the Island of Nisyros

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Abstract

The study presents the preliminary results of a project having as an overall objective to examine whether digital games have an impact on teenagers' cultural identity formation. Having completed the first stage, the results regarding digital games' impact on knowledge about local history are reported. Thirty high-school students from the island of Nisyros studied the local history, culture, traditions, and customs of their island, using printed material, board games, and digital games. Data were collected using evaluation sheets and a short questionnaire. The results indicated that the digital games were more effective in terms of knowledge acquisition compared with the other tools. Moreover, students were more motivated to learn and enjoyed their teaching more using this medium. Implications for research and practice are also discussed.

Keywords: culture, customs, digital games, high school students, local history, tradition.

1. Introduction

The term "identity" is a multidimensional construct describing "peoples' concepts about who they are, of what sort of people they are, and how they relate to others" (Abrams & Hogg, 2006: 2), Identity encompasses the personality, beliefs, and qualities of a person or a group (Leary & Tangney, 2011), allowing the senses of uniqueness, continuity, and affiliation (Waterman, 1984). There are many forms of identity, such as gender/sexual, social, ethnic, religious/spiritual, personal, and cultural. Yet, there are other types of identity, related to the place one lives, such as national, regional, urban, and local. The urban and local identities mostly refer to people living in urban areas; they are less associated with one's origins/cultural background as they answer the question "where do I live?" instead of "where do I belong?" (Paasi, 2003). On the other hand, the cultural identity and, up to a certain degree, the regional identity, encompass the history, culture, traditions, and customs followed by a group of people in a certain region. Both are stronger (or used to be stronger) to people living in rural and remote areas.

In our post-modern, multicultural, fast-paced societies, individuals' sense of identity is put in doubt. In fact, large groups of citizens are affected, especially in nations that still strive to strike a balance between the past and post-modernism (Valasiadis, Katsadoros, Kakampoura & Fokides, 2017). From a pedagogical and psychological perspective, this ever-changing and rather unstable post-modern environment and the resulting identity crises, have a negative impact on adolescents' identity formation. They are forced to constantly redefine their yet undeveloped

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identities, they are exposed to confusion, and they are rendered vulnerable to distress and internal conflicts (Bendle, 2002). On the other hand, regionality and culture could be used as a base for the formation of stable identities, since both call upon a sense of community that can merge with an array of coexisting and overlapping elements like gender, sexuality, religion, race, and ethnicity (Tomlinson, 2003).

- Cultural identity can act as the basis for the formation of stable identities.
- Local history includes elements of the locals' customs, traditions, and culture.
- Digital games are an effective tool for teaching local history to high-school students.
- Fun, enjoyment, and motivation contribute to digital games' effectiveness.

Having in mind the above, the project "Topognosia" (from the Greek words topos = region/place and gnosis = knowledge; thus, the term means knowing the region) was proposed (Valasiadis et al., 2017). Its initial objective was to examine whether technology, namely, digital games, can help students living in urban areas to form strong local identities by increasing the attractiveness of this type of identity, so as students to embrace it voluntarily for self-description purposes. Having brought the above to a successful conclusion, it was considered interesting to expand the scope of the project by examining whether digital games can help adolescences living in rural/remote areas to form cultural identities as well. The study at hand presents the preliminary results of "Topognosia"'s second phase. Specifically, it reports the impact of digital games on high-school students' knowledge (in terms of history, traditions, and culture) for the place they live. For that matter, the island of Nisyros was selected, which is a small community, relatively isolated, affected by both tourism and urban pull. Details for the project are discussed in the sections to follow.

2. Cultural identity and local history

Part of the individuals' identity is their cultural identity, the feeling of belonging to a group that shares the same and distinct cultural background. Thus, cultural identity is shaped by cultural identifiers and conditions such as race, ethnicity, regionality, nationality, religion, language, sexuality, aesthetics, local history, social class, traditions, customs, or even food (Ennaji, 2005; Holliday, 2010; James, 2015). The Three-Stage Model of Ethnic Identity Development (Phinney, 1989) provides the basis for understanding the formation of cultural identity. During the "unexamined cultural identity" stage, children accept the ideas of others (e.g., parents, relatives, community, and media) on cultural matters; they are not interested in exploring cultural issues. During the "cultural identity search" stage, individuals (teenagers and young adults) question and explore their culture in order to understand it as well as for recognizing the implications of belonging to a given culture might have on their lives. Lastly, during the "cultural identity achievement" stage, people accept and internalize their cultural identities, achieving increased self-confidence and positive psychological adjustment.

Cultural identities are influenced by several factors. While the borders between cultures were thick in the past, they have become thin, especially in urban areas due to the population's diversity and multiculturalism. This resulted in a shift of the basis of social unity to locational contiguity and local identities. In fact, some argued that the preservation of cultural identity should be avoided, as it divides societies and that it has to be replaced by cosmopolitanism, which provides a greater sense of shared citizenship (Gans, 2003). Culture can be seen as a form of historical reservoir. Then again, the historical pool upon which individuals draw their common identity is often revised and altered, either consciously or unconsciously, for bolstering the strength of their cultural identity or for forging one that better suits their needs (Shindler, 2014). States may also have an interest in shaping or modifying cultural identities (Brown, 2001). They can do that by providing (or by enforcing) a framework for cultural identity,

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an external cultural reality, influencing individuals' internal cultural realities. The digital media and the Internet play a significant role (Singh, 2010). In a techno-cultural context, many prefer to follow/imitate the social norms presented by the media, instead of drawing knowledge from traditional channels (e.g., cultural groups). Youths also form a virtual culture, consisting of norms and behaviors associated with the online world that exceed the boundaries of nations and local cultures. In this respect, the Internet and digital media function as vast "identity laboratories" that could jeopardize the development of more stable and long-lasting identities (López, Opertti & Vargas Tamez, 2017). Tourism is another force that shapes cultural identities. In fact, tourism is a double-edged sword; depending on how the locals handle tourism but also on how tourists perceive the locals (Shepherd, 2002), tourism can preserve or rebuild cultures that otherwise might get extinct (Stronza, 2008) or it can corrode and degrade them (Medina, 2003). The latter is more evident in developing and undeveloped countries. Together with their money, tourists from the developed world also brought their (western) ideologies and values, commodifying and impoverishing the culture of locals (Medina, 2003).

A question that emerges is how to help individuals, especially the younger ones, to develop a cultural identity that they will be proud of and that will also be well-aligned with the contemporary needs (and not just a mockery of outdated practices and beliefs), so that it can act as a sound basis for the development of their identities as a whole. One solution is to educate young people about their local cultural heritage and history. Both strongly influence cultural identity formation, as they represent the temporal and spatial continuity of a region, to which inhabitants can be emotionally attached (Kučera, Kuldová, & Chromý, 2008; Riukulehto, 2015), feel the sense of belonging, and increase their sense of social trust (Stefaniak, Bilewicz & Lewicka, 2017).

Then again, there are some issues that are still unresolved. In fact, coming to a consensus of what local history study entails is still problematic. Until the second half of the previous century, local history was viewed as a (rather negligible) subset of academic history. Sites that played an important role in history (on a national or global level), or sites of important historical heritage, have always been the focus of scientific research and received well-deserved attention by the media, academics, and the educational systems. This may give the (false) impression that local history is about places of high historical status. Moreover, until recently, amateur historians or associations dominated the field. Being unwilling to move beyond the study of their immediate locality and resources, the significance of their work was not recognized and was often dismissed as not being academically rigorous (Tosh, 2010).

The lives and deeds of ordinary people and their contribution to an area or community is also local history. It seems that this notion is steadily gaining ground, as more researchers embrace this view (Dixon & Hales, 2014; Tosh, 2010). The study of local values, customs, and traditions can also be seen as an aspect of local history, having an impact on individuals' awareness of their cultural identity (Dichter, 2015) and on their sense of local empathy (Perrotta & Bohan, 2017). Finally, the study of locals' social contributions may also be of value in the context of local history, as these usually have a local rather than a national impact (de Kraker, 2017). From the above, it is evident that local history is not just localized formal history. It includes elements that might not be of interest on a larger scale/audience (e.g., customs, traditions, and culture), but they are definitely important on a local scale/community.

3. Digital games

In the context of using technology for teaching, an issue commonly discussed, is how to provide students with tools and applications that are interesting and motivating. Digital games seem to be an interesting solution, as the bulk of the relevant research reported positive results in terms of the learning outcomes, students' enjoyment, motivation, and engagement in the learning process (e.g., Fokides, 2018; Hainey, Conolly, Boyle, Wilson & Razak, 2016; Qian & Clark, 2016).

Digital games provide experiences in environments that are rich, complex, and interactive. Thus, they provide safe settings for experimentation, which allows the transfer of knowledge to the real world. Therefore, the experience acquired, which is considered as being the basis for knowledge construction, is not simply transmitted but is the result of reflection and interaction with the environment (Braghirolli, Ribeiro, Weise & Pizzolato, 2016). In addition, digital games promote discovery learning because they enable users to engage in authentic tasks, in a specific context, and to solve realistic problems (Gee, 2003).

Several learning theories give support to the use of digital games in education (Braghirolli et al., 2016). Learning theories based on behavioral perceptions view learning as a trial and error process aiming to modify an observed behavior. This perception is evident in many games, which seek to educate students in concepts or skills with repetitive practices. In contrast, constructivist perceptions support the active participation of students in the learning process, so that new knowledge is constructed by them (Shute, Rieber & Van Eck, 2011). In this case, the main objective of the use of digital games in the educational process is to achieve a student-centric interactive experience (Becker, 2005).

The most significant advantages of educational digital games seem to be their motivational appeal and that they encourage learning and the active participation of students in knowledge building (Gee, 2003). Moreover, students pay more attention to a learning activity when it is presented through a game (Garris, Ahlers & Driskell, 2002). It has also been observed that when students play educational games, they tend to devote more time in trying to learn, which may positively affect the learning outcomes (Sandberg, Maris & De Geus, 2011). Another interesting advantage is that digital games provide direct feedback; students can immediately see the results of their actions or if they answered correctly a question (Prensky, 2003). Students are also encouraged to explore and experiment, leading to the discovery of new concepts and strategies (Kirriemuir, 2002). Finally, players quite naturally make mistakes. Then again, these mistakes are limited to the virtual world of the game and have no negative effects whatsoever in the real world; thus, they can be used as a source of learning (Fokides, 2018).

To the best of the authors' knowledge, there are no digital games that tried to explicitly teach local history at any level of education. On the other hand, there is a number of digital educational games related to cultural heritage and for raising cultural awareness. For example, "Icura" informs players about the Japanese culture, "Discover Babylon" examines the contribution of ancient Mesopotamia to modern culture, and "Papakwaqa" is a game about the tribal beliefs, customs, and ceremonies of the Atayal minority in Taiwan (Mortara, Catalano, Bellotti, Fiucci, Houry-Panchetti & Petridis, 2014). In the context of teaching formal history, educational games (commercial and non-commercial) have been used quite extensively and the number of studies examining their impact on learning is on the rise (McCall, 2016). For example, Squire, DeVane, and Durga (2008) used "Civilization" to students having weak performance in history lessons, noting that their interest was strengthened and that they focused on the historically accurate sets of rules contained in the game. In another study, "Making History" was used for the teaching of the 2nd World War and it was found that students were much more active and devoted to the study of the learning subject (Watson, Mong & Harris, 2011). There are also 3D historical games. For instance, in the "Battle of Thermopylae," players can examine the historical context and the importance of the battle, the opponents, their cultural differences, and their strategic choices (Christopoulos, Mavridis, Andreadis & Karagiannis, 2013). Most studies reported positive learning outcomes that were attributed to the same factors presented in the preceding paragraph. Additionally, researches have concluded that the historical consciousness of students can be fostered through historical digital games, suggesting that the medium's potential should be further exploited (McCall, 2016; Mortara et al., 2014).

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On the basis of the arguments presented in the preceding sections and the lack of studies examining the impact of digital games on the teaching of local history, culture, traditions, and customs, the present study explored the following research hypotheses:

H1. Students living in rural areas have limited knowledge for the history, culture, traditions, and customs of the place they live.

H2a and H2b. The use of digital games for teaching local history, culture, traditions, and customs, produces better learning outcomes compared to the use of other tools. The retention of knowledge is also better.

H3 to H5. Students consider digital games as a fun and joyful experience (H3), an effective tool in terms of knowledge acquisition (H4), and are more motivated to learn (H5).

4. Method

The island of Nisyros was selected as a typical example of a small community having a rich local history and culture, suffering from depopulation (current population 987, three times less than fifty years ago), still relatively isolated and undeveloped (connected to the mainland only by ship, twice a week). A within-subjects research design with three treatments was chosen. In this type of research, participants are exposed to all treatments. Given that the pool from which the sample was drawn was small (Nisyros has few students), this design was considered the most appropriate, as it allows for quite reliable results even if the sample sizes are small. As for the treatments, these were the three teaching tools that the team decided to use, namely, printed material, board games, and digital games, as presented in the "Materials" section.

4.1 *Participants*

As presented in the "Cultural identity and local history" section, teenagers are in the process of developing their cultural identity, as they have entered the "cultural identity search" stage. Consequently, it was decided high school students to be the target group (ages 13-16). Forty students (the entire high school population of Nisyros) were selected as the study's sample. In a meeting, students' parents were briefed and their written agreement for their children's participation was obtained. The school's headmaster and the classes' teachers were also briefed for the study's objectives. The project lasted for nine two-hour sessions (three for each tool), from early-November 2018 to late-December 2018.

4.2 *Materials*

As there is no specific (and formal) teaching material available for Nisyros' local history/traditions/culture, it was assembled using freely available, yet highly reliable, Internet sources. In fact, almost all material came from the official web sites of the Nisyrian Studies Society (http://www.nisyriakesmeletes.gr/index-en.html) and the municipality of Nisyros (http://www.nisyros.gr/index.php/en/). As already mentioned, the study followed a within-subjects research design with three treatments (each teaching tool was considered a treatment). A prerequisite for this type of research is treatments' equipollence (i.e., to be of equal power, validity, and significance). A problem that had to be resolved was that the same subjects could not be taught to the same students using three tools. That is because students after acquiring some knowledge on a subject using the first tool, would have the chance to learn more on the same subject using the second, and even more using the third, rendering the tools' learning outcomes incomparable. To overcome this problem, it was decided the teaching material, though different in each tool, to

be equal in terms of (i) cognitive load (e.g., same number of dates, names, events, difficulty level, and quantity), and (ii) similarity, meaning that a subject in one tool had similar/corresponding subjects in the other tools. For example, students learned about Palo's hot springs using printed material, Mandraki's hot springs using the board games, and Avlaki's hot springs using the digital games. Following this logic, nine teaching units were formed (three for each tool). Table 1 presents the distribution of the teaching material in each treatment/teaching tool.

Table 1. The learning subjects per unit and per tool

Unit	Subject	Tool1	Tool2	Tool3
1/4/7	Towns and places of interest	The town of Emporio Pachia ammos beach Pantoniki's castle	The town of Mandraki Hohlaki beach Palaiokasto	The town of Nikia Avlaki beach Parlentia's castle
		Taxiarchon church	Virgin Mary's church	The church of the Presentation of Virgin Mary
	Nature	Hiking, trekking, flora, and fauna	Hiking, trekking, flora, and fauna	Hiking, trekking, flora, and fauna
2/5/8	History	Nisyros during the early Byzantine period	Nisyros during the middle Byzantine period	Nisyros during the late Byzantine period
		The Ottoman occupation	The Italian occupation	The German occupation
	The volcano	The volcano, 1st eruptions' phase Palo's hot springs The Giali islet Perlite	The volcano, 2nd eruptions' phase Mandraki's hot springs The Stroggili islet Volcanic glass	The volcano, 3rd eruptions' phase Avlaki's hot springs The Pirgousa islet Pumice stone
3/6/9	Culture and tradition	The Volcanological observatory	The archaeological museum	The Volcanological museum
		Gnagoras Association	Porphyrians Association	The Nisyrian Studies Society
		The myth for Nisyro's creation	The tradition of Virgin Mary of Spiliani	The tradition of St. Theologos
		The kalantira custom	The mug custom	The lantern custom
		Nisyrian recipes/foods/drinks	Nisyrian recipes/foods/drinks	Nisyrian recipes/foods/drinks
		The Nisyrian language idiom	The Nisyrian language idiom	The Nisyrian language idiom

The most commonly used tool for teaching history is in the form of printed material. Thus, a booklet was assembled including the units designated for the printed material tool (see Table 1, Tool1 column). Also, exercises/short questions were included at the end of each unit. Given that digital games were the study's focus, it was considered interesting to use board games as well (in essence digital games' analog counterparts), in order to examine whether they can produce similar results. Thus, three board games were developed (Figure 1). Each game consisted of a 60X80cm board (having as a background Nisyros' map), a dice, pawns (representing the players), forty cards with the picture of an almond on one side (almonds are a typical product of Nisyros), and twenty cards with the picture of a bottle of soumada on one side (soumada is a soft drink made from almonds' extract). A unit's learning material (see Table 1, Tool2 column) was split into small segments and these were printed on the other side of the almond cards. On the other side of the soumada cards a unit's questions/exercises were printed (one in each card, similar to the ones in the printed material). The board was divided into two halves; one half had almond squares, the other had soumada squares, while both had a number of "trap" squares

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(forcing the player to return to the start, or return a card). The players started from the almond half of the board, rolled the dice, and moved their pawns accordingly. If a pawn ended in an almond square, the player picked the top card from the almonds' cards stack, read it, allowed the other players to read it too, and took possession of the card. Once there were no more almond cards left, the players could move to the boards' second half (the soumada squares). When a pawn was in a soumada square, the player picked the top card from the soumada's cards stack and tried to answer the question. If his/her answer was correct, the player took possession of the card; if not, the other players could try to answer the question. The game ended when there were no more soumada cards left, while the winner was the player having the largest sum of almond and soumada cards.

Figure 1. The board games

Finally, three digital games were developed, by the authors, using Clickteam Fusion 2.5 (https://www.clickteam.com/). Fusion is relatively easy to learn software for developing multimedia applications (2D games included). The digital games were, more or less, similar to the board games and followed the same gameplay and set of rules. An image of the volcano was used as a background and instead of dividing the board into two halves the games had two levels, one for the almond squares and (digital) almond cards (using the learning material from Table 1, Tool3 column) and one for the soumada squares and the (digital) soumada cards (Figure 2). The players were represented as warriors exploring the volcano while trying to avoid monsters (the "trap" squares of the board games).

Figure 2. The digital games

4.3 *Procedure*

During the first three sessions, students worked using the printed material. For the next three sessions, the board games were used and for the final three sessions, students played the digital games. Given that playing the games or studying the printed material required a considerable amount of time and as it was important to allow students to assimilate at their own pace what they were learning, it was decided to allocate two teaching hours for each session. It was

also decided students to work in small groups (three students in each group). The teaching procedure, regardless of the tool that was used, was as follows:

- The teachers made a short introduction and initiated the first round of discussions between students for what they were about to learn.
- Next, students either studied the printed material and completed the relevant exercises or played the games (digital or board games).
- In the final stage, worksheets were used that asked students to record their opinions/ideas/views on certain events/facts related to what they have learned while studying the printed material or while playing the games. Following that, each group presented their ideas and discussed them with the rest of the class.
- During sessions, the teachers facilitated the learning process; they started or joined in students' debates and draw their attention to what was significant/relevant (without enforcing their views or giving direct answers).

4.4 Instruments

In order to collect data for the learning outcomes, a series of evaluation sheets was devised (one Pre-test, one for each session-nine in total, and one Delayed post-test). The Pre-test examined students' prior knowledge in subjects related to the island's local history, culture, customs, and traditions. The Delayed post-test was administered three weeks after the end of all sessions, having as an objective to examine knowledge retention. Students completed the rest of the evaluation sheets right after the end of a session. All the evaluation sheets followed the same logic: (i) they had fill-in-the-blanks, multiple-choice, yes-no, and open-ended questions; (ii) in most cases students we urged to provide an explanation for their answer in a question; (iii) they thoroughly examined all the material included in a session; and (iv) the ratio of difficult to easy questions was two to one.

For examining H3 to H6, four factors included in a validated, modular scale designed for examining digital educational applications were selected (Fokides, Atsikpasi, Kaimara & Deliyannis, 2019): fun/enjoyment (six items), subjective learning effectiveness (six items), and motivation (three items). All questions were presented in a five-point Likert-type scale (worded from "strongly disagree" to "strongly agree").

5. Results

Out of the initial sample, ten students had to be excluded as they were absent in one or more sessions. Therefore, the final sample size was thirty students (aged 13 to 16, 18 girls and 12 boys, all ethnic Greeks born in Nisyros), who were taught Nisyros' history, customs, traditions, and culture, using three different tools (Tool1 = printed material, Tool2= board games, and Tool3 = digital games). All the evaluation sheets were graded and the resulting data were imputed into SPSS 25 for further analysis. The average score of the three evaluation sheets per participant and per tool was also calculated and was used as the study's dependent variable. Table 2 presents descriptive statics for students' scores in each method. Examining the results in the Pre-test, it is more than clear that students did not know much about Nisyros; thus, H1 was confirmed.

One-way ANOVA repeated measures tests were to be conducted, using the average scores of the evaluation sheets, for examining the differences between the three tools. Prior to conducting these tests, it was checked whether the assumptions for this kind of statistical analysis were met. It was found that the data were not normally distributed. Thus, a non-parametric analysis was selected, namely Friedman's Two-way Analysis of Variance Test by Ranks (Table 3). As the results demonstrated that there were statistically significant differences between the three tools, the next step was to conduct a series of post-hoc pairwise comparisons using Wilcoxon's

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Signed Ranks Test (which is also a non-parametric test). Two sets of this test were performed, one for the averages in the evaluation sheets (Table 4) and one for the delayed post-tests (Table 5).

Table 2. Descriptive statistics for the evaluation sheets

	Tool1		Tool2		Tool3	
	M	*SD*	*M*	*SD*	*M*	*SD*
Pre-test	35.17	8.20	34.40	7.70	35.07	5.90
Evaluation sheet 1	50.63	19.22	54.27	17.00	62.53	20.07
Evaluation sheet 2	52.87	19.56	59.83	18.76	61.80	20.70
Evaluation sheet 2	53.77	20.54	61.17	19.93	62.00	21.60
Evaluation sheets' average	52.42	19.47	58.42	18.22	62.11	20.67
Delayed post-test	56.37	12.36	67.33	13.86	77.35	9.38

Note. The maximum score in all evaluation sheets was 90

Table 3. Friedman's test

N = 30, *df* = 2	Tool1	Tool2	Tool3	Delayed post-test Tool1	Delayed post-test Tool2	Delayed post-test Tool3
Mean Rank	1.17	2.28	2.55	1.10	2.08	2.82
χ^2		33.145			44.891	
p		< .001			< .001	

Table 4. Pairwise comparisons for the evaluation sheets

	Tool1	Tool2	Tool1	Tool3	Tool2	Tool3
M	52.42	58.42	52.42	62.11	58,42	62.11
SD	19.47	18.22	19.47	20.67	18.22	20.67
z	4.207		4.361		3.288	
p	< .001		< .001		.001	
r (effect size)	0.54 (medium)		0.56 (medium)		0.42 (small to medium)	

Table 5. Pairwise comparisons for the delayed post-tests

	Post Test Tool1	Post Test Tool2	Post Test Tool1	Post Test Tool3	Post Test Tool2	Post Test Tool3
M	56.37	67.33	56.37	77,35	67,33	77,35
SD	12.36	13.86	12.36	9.38	13.86	9.38
z	4.662		4.784		3.937	
p	< .001		< .001		< .001	
r (effect size)	0.60 (medium)		0.62 (medium)		0.51 (medium)	

Taking together the results in the above tables, it can be noted that, in all cases, Tool3 (digital games) produced better learning outcomes when compared with both the other tools. Tool2 (board games) produced better learning outcomes only when compared with Tool1 (printed material). As a result, H2a and H2b are confirmed; the use of digital games for teaching local history, culture, traditions, and customs, produces better learning outcomes compared to the use of other tools and the retention of knowledge is also better.

The results of the four factors included in the questionnaire are presented in Table 6. Prior to analyzing the data, its internal consistency was checked using Cronbach's alpha and it was found to be good (α = .814) and the same applied for the reliability scores of the four constructs (α = .788 to α = .861). As with the evaluation sheets, one-way ANOVA tests and post-hoc comparisons were conducted, in order to examine the differences in participants' responses. It was found that:

- Differences were noted in fun/enjoyment [$F(2, 27) = 806.89$, $p < .001$]. The pairwise comparisons revealed that fun in Tool1 received the lowest ratings, while Tool2 it received higher ratings compared with Tool1 but lower ones compared with Tool3 [Tool1-Tool2, $p < .001$, $d = 6.33$ (extremely large); Tool1-Tool3, $p < .001$, $d = 17.93$ (extremely large); and Tool2-Tool3, $p < .001$, $d = 2.11$ (extremely large)].
- The same as above applies for:
  - Subjective learning effectiveness [$F(2, 27) = 1567.57$, $p < .001$; Tool1-Tool2, $p < .001$, $d = 5.46$ (extremely large); Tool1-Tool3, $p < .001$, $d = 8.84$ (extremely large); and Tool2-Tool3, $p < .001$, $d = 1.71$ (very large)].
  - Motivation [$F(2, 27) = 713.94$, $p < .001$; Tool1-Tool2, $p < .001$, $d = 6.35$ (extremely large); Tool1-Tool3, $p < .001$, $d = 7.93$ (extremely large); and Tool2-Tool3, $p < .001$, $d = 2.08$ (extremely large)].

Given the above, H3 to H5 are accepted; participants enjoyed their teaching more when they played the digital games, considered them more effective in terms of knowledge acquisition, and were more motivated to learn.

Table 6. The questionnaire's results

Factor	Tool1		Tool2		Tool3	
	M	*SD*	*M*	*SD*	*M*	*SD*
Enjoyment/fun	2.13	0.22	4.33	0.44	4.99	0.05
Subjective learning effectiveness	2.52	0.30	4.27	0.34	4.74	0.19
Motivation	2.06	0.52	4.63	0.24	4.99	0.05

6. Discussion

For examining the impact of digital games on high-school students' knowledge for their local history, culture, traditions, and customs, the first stage of a project was implemented. A finding that emerged from the results' analysis that is worth noting, is participants' low scores in the Pre-test. Indeed, just a third of the questions were answered correctly (see Table 2, first row). Consequently, a conclusion that immediately comes in mind, is that teenagers do not know much about the place they live. This finding is upsetting and it raises even more concerns if one takes into consideration that the study's sample was the three-quarters of Nisyros' high-school students. That is because individuals' knowledge about local cultural heritage and history is important for the formation of their cultural identities (Kučera et al., 2008; Riukulehto, 2015), especially when they are teenagers at the "cultural identity search" stage, as were the study's sample. Although the project, at this stage, did not examine issues related to cultural identity, the above finding can signify a number of problems ranging from participants' lack of interest about the place they live to problems related to their cultural identity formation.

Coming to the evaluation sheets and the Delayed post-test, a simple overview of the results is enough for concluding that there was a significant positive change, in terms of knowledge acquisition, ranging from 60% to 120% (depending on the tool that was used). Further analysis, revealed statistically significant differences between the tools, while the effect sizes were, in most cases, medium. Specifically, the printed material had the worst learning outcomes compared with the other two teaching tools, the board games were ranked second, while the digital games produced the best results among the three tools. On the basis of this finding, it can be argued that digital games are an effective tool for teaching local history. Thus, on one hand, the study provides further support to the findings of previous research examining the effects of digital games in the context of teaching formal history (e.g., Christopoulos et al., 2013; McCall, 2016; Mortara et al., 2014; Watson et al., 2011), and, on the other, it extends the literature by providing evidence for the positive impact of digital games when used for teaching local history, culture, traditions, and customs.

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A series of factors may have contributed to this result. First, all tools considered, students mostly worked by themselves, while the teachers acted as facilitators of the learning process (see "Procedure section"). The fact that the results were better when the digital games were used, confirms previous studies supporting the view that digital games: (i) foster students' autonomy and control over the learning process (Nunes, Bryant & Watson, 2009) and (ii) encourage social learning by providing a platform for exchanging information and ideas (Tolmie et al., 2010). Another interesting finding is that participants considered the digital games as being more effective teaching tools. In fact, not only there was a statistically significant difference between the three tools in the relevant group of items in the questionnaire, but also the effect sizes were impressive. This can be seen as a strong indication of students' preference and appreciation for this alternative teaching tool as well as for the teaching method that was followed (Anyaegbu, Ting & Li, 2012). The results in the questionnaire also indicated significant differences, in favor of digital games, in motivation and enjoyment, again with remarkable effect sizes, confirming the findings of others (e.g., Hainey et al., 2016; Qian & Clark, 2016). Moreover, fun when using the digital games and students' interest may have been intensified by the fact that, in the digital games, there was an automated scoring system (not present in the board games). This further encouraged students' participation, as they had direct feedback on the results of their actions (e.g., when they correctly answered a question). The element of control of the learning process, through the continuous feedback, has been highlighted by others (Larsen, 2012). In sum, it seems that digital games support a chain of events and transformations, at least better than other tools; the increased fun/enjoyment when playing them positively affects motivation to learn, which, in turn, has a positive impact on the learning outcomes (Fokides, 2018).

6.1 *Implications for research and practice*

The study's results might have a number of implications for education administrators as well as for software developers. A major issue, that had to be resolved, prior to the beginning of the project, was that of the development of the digital games. Although Multimedia Fusion is not that difficult to learn and master, the design of digital games, by non-specialists, proved to be a time-consuming and laborious process. In fact, as the games were developed by "amateurs," they were far from reaching the standards of ones developed by professionals. In this respect, an expert can probably recognize several flaws and problems having a negative impact on participants' gaming experience. By exerting strong criticism, it could be argued that the games' shortcomings (both in terms of implementation and content), may have adversely affected the learning outcomes. Taking into consideration the above, one might argue that such an effort was not justified (Kluge & Riley, 2008). On the other hand, it is not feasible to professionally develop the vast number of games required for teaching the local history of each and every place/region. Therefore, software tools that make the whole process much more efficient and appealing to non-experts are urgently needed (Scacchi, 2012).

The study's results can also lead to a number of suggestions to education administrators. Students' positive attitude towards the use of digital games in teaching, together with the satisfactory learning outcomes, renders their educational exploitation an interesting idea. Also, time is a critical factor. Students need to have enough time at their disposal so as to play the games and study at their own pace. Consequently, the school's curriculum and the hours allocated for subjects in which digital games are going to be used have to be to be reconsidered.

6.2 *Limitations and future research*

Though the results were interesting, to say the least, there are limitations to the study that need to be acknowledged but can also serve as directions for future studies. The research

involved a relatively small number of students living on a small island. Although the sample size was adequate for statistical analysis, the results' generalizability is difficult. The number of sessions was also small. A common problem is that students may not have been completely honest in their responses in the questionnaire. Lastly, the games were not developed by professionals. Thus, future studies can include a larger number of sessions and a larger sample size allowing for a more thorough examination of digital games' impact. The use of games that are the result of a collaboration between education and computer specialists is also recommended. Variations of the teaching method and/or the use of other digital tools (e.g., web pages and augmented reality games) would allow the identification of the advantages or disadvantages of digital educational games. Furthermore, qualitative data collection tools would allow the holistic understanding of their educational value.

7. Conclusion

In conclusion and taking into account the study's limitations, it appears that, in the context of teaching local history, culture, traditions, and customs to high-school students, digital games are an appealing as well as an entertaining tool that motivates them to learn more for the place they live. What is more, when compared with other tools, the learning outcomes are expected to be better. In this respect, the potential of digital games should be further explored. Toward this direction, the team is already planning the next stage of the "Topognosia" project, having as an objective to examine the impact of digital games on attitudinal change and on cultural identity formation.

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