Content and Language Integrated Learning through an online Game in Primary School: A case study

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Abstract: In this paper an educational design proposal is presented which combines two well established teaching approaches, that of Game-based Learning (GBL) and Content and Language Integrated Learning (CLIL). The context of the proposal was the design of an educational geography computer game, utilizing QR Codes and Google Earth for teaching English Language to Greek Primary School students. This integration provides a motivational and cognitive basis for language learning, since it represents a meaningful, contextualized activity and on the other hand, gives students the chance to expand their cognitive skills and use more sophisticated language. The proposed game immersed 11 to 12-year-old students in problem solving challenges regarding the use of geography in realistic contexts. While attempting to solve these problems, students were engaged in eight-week collaborative work, involving six levels of gameplay by following hints, provided by QR codes images. The findings of this case study suggest how foreign language learning can successfully take place within a geography game-based learning environment, and they underscore the efficacy of approaching GBL in terms of performance. Students' performance was evaluated through knowledge tests and various complex tasks throughout the game play, involving writing and reading skills. In general, students showed positive attitudes towards the game and the post-test results have significant differences compared to those of the pre-test, in terms of vocabulary acquisition and reading skills in the foreign language and geography knowledge. The results also showed that the collaboration required by this game, allowed the students to interact in a controlled environment, where they undertook roles and responsibilities. To this end, the findings will make an important contribution to the empirical evidence of GBL particularly with regards to its application in primary education.

Keywords: QR Codes, Google Earth, CLIL, Language learning, GBL

1. Introduction

The present case study is a follow up of a previous research proposal, in which an idea of combining the educational approaches of GBL and CLIL as a basis for foreign language learning was described (Dourda et al, 2012). GBL, which supports and facilitates the learning process in a more comfortable environment, and CLIL, which is believed to help students improve specific language terminology by centering on meaning, were effectively implemented in the context of the present case study (Anderson et al, 2008; Dalton-Puffer and Smit, 2007). In this paper, the results of the study on language learning aspects such as vocabulary and reading skills as well as the learning strategies, followed by the students, are presented. In addition, content knowledge and collaboration also move into focus.

The main focus of the study was English as a foreign Language (EFL) Teaching, through an interdisciplinary approach which involves gaming, geography, problem solving and critical thinking. A detective game was designed and utilized as means of introducing geography related content in order to provide hints for the detection of a criminal. The case study was conducted with the participation of 17 students from a public primary school, in Greece. Thus, 11 to 12-year-old students were introduced to geographical information, as well as to post task activities, in a foreign language, while attempting to solve a mystery, by combining data within a game context. The aim of the study was to explore the teaching potential deriving from the combination of GBL and CLIL approaches in order to produce an authentic, meaningful and enjoyable learning context.

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The paper is structured as follows; initially the theoretical background is presented, discussing the GBL and CLIL teaching approaches within the Foreign Language teaching context. Then, the research methodology and results are presented, before the concluding discussion.

2. Theoretical Background

2.1 GBL in Foreign Language (FL) Learning context

As researchers have continuously urged foreign language educators to seek alternatives to traditional instruction, during the last decade the GBL educational approach keeps increasing in the foreign language learning context, utilizing the ability of games to make language education entertaining and to provide learning environments that contextualize knowledge and immersive experiences for learners (Anderson et al, 2008; Meyer, 2009).

GBL, which is used to describe the application of games in learning, provides approaches that better corresponds to students' requirements or habits and, as a consequence, actively engage students in the learning process (Smith and Mann, 2002; Gee, 2003). GBL in particular embodies the philosophy of 'learning through a grammar of doing and being' and provides students with opportunities for authentic learning (Squire, 2006). Through various kinds of software, GBL assists students in language learning, while developing their problem solving and critical thinking skills through engagement and iterative feedback that are crucial to the learning process (Donmus, 2010). In addition, GBL approach to foreign language learning provides more effective learning compared to traditional methods, develops positive attitudes in students and increases the retention process (Donmus, 2010).

Computer games are effective because learning is not only relevant but also applied and practiced within a meaningful context, where students are encouraged to combine knowledge from different areas in order to choose a solution or to make a decision at a certain point (Van Eck, 2006). Thus, computer games can be used to easily learn a particular content and can be useful instruments for learning specific strategies (Gros, 2007). Moreover, the adaptive qualities of most games ensure that "learners are motivated to persist in their learning, thus increasing the chance of further exposure to target language input, and opportunities for output" (Reinders, 2012).

GBL also provides the opportunity for Content-based Learning (CBL), as "games are not necessarily about memorizing or providing correct answers", but rather about the comprehension of the content provided in the game and the application of various learning strategies (Sørensen and Meyer, 2007: 561). Furthermore, Sørensen and Meyer (2007: 561) add that the role of GBL in foreign language learning "has been moving away from an association with drills, grammatical explanations and translation tests, into more communicative based contexts where task-based, project-based and content-based approaches are integrated".

Finally, in a number of studies that focused on the retention of learning and students' preference, results were better when using the GBL approach (Pivec and Dziabenko, 2004). However, other studies exist in which the results are not so clearly in favor of GBL, as it is not a flawless learning method per se (Pivec and Dziabenko, 2004). Although engagement and motivation are significant advantages of GBL, they are not enough for educational purposes. The design of the learning environment is a crucial factor for improving learning, considering that a well-designed game is user-centered and promotes students' social and cognitive development (Gros, 2007).

2.2 Content and Language Integrated Learning (CLIL) in FL Context

As European educational systems are making great efforts to improve students' competence in foreign languages, a different approach, described with the term CLIL, is gaining importance and becoming a well-established teaching method all over Europe (Järvinen, 2007). According to Eurydice (2006: 8) the acronym

CLIL is used to describe that school situation whereby "a foreign language is the vehicle to teach certain subjects in the curriculum other than the language lessons themselves".

The CLIL approach serves as a tool for the promotion of the foreign language teaching and has been praised on many different grounds. First of all, the primacy of meaning over form is considered to have positive effects on the affective dimension, reducing target language anxiety and increasing interest and motivation in the learners (Dalton-Puffer and Smit, 2007). Secondly, it is thought that CLIL is effective, because by being able to comprehend and reason about a content in a foreign language, students have the chance to improve themselves in specific language terminology and generally to expand their cognitive skills (Lasagabaster, 2008). Furthermore, learning about geography, science or history in the CLIL classroom gives the use of the foreign language a purpose and a kind of meaningfulness that is believed to be absent from typical language instruction (Dalton-Puffer and Smit, 2007). This may happen because it provides students with repeated, natural exposure to the language which mirrors the environment of first language acquisition (Troncale, 2002). As a result, learning a foreign language through content provides an opportunity to teach academic tasks and higher order thinking skills which is not only beneficial for foreign language students, but also necessary for their overall success in school (Troncale, 2002).

It appears that certain language competence aspects benefit more from the CLIL method. More specifically, receptive skills, lexicon, fluency and affective outcomes gain most from this method. On the side of the productive skills, it can be said with regard to speaking that CLIL students often display greater fluency, quantity and creativity and show the kind of higher risk-taking inclination often associated with good language learners (Dalton-Puffer, 2002). Positive affective outcomes of CLIL are also observed, while after a certain amount of time spent in CLIL lessons the learners seem to lose their inhibitions to use the foreign language spontaneously for face-to-face interaction (Dalton-Puffer, 2002).

What is at issue in this paper is clearly the role of reading and lexicon in language teaching, which seem to benefit more from the CLIL approach. Tsai and Shang (2010) have shown that utilizing CLIL instruction enhances students' reading comprehension as well as critical thinking ability. The greatest gain in terms of the language system, however, is undoubtedly produced in the lexicon, as through studying content subjects in the foreign language CLIL learners obtain larger vocabularies of subject-specific terms (Dalton-Puffer, 2002).

2.3 Foreign Language Learning Strategies

Although many students are successful in learning a foreign language regardless the teaching method, it is argued that a wrong combination between the learning style of a student and the teaching style of educator can lead to stress and frustration and not to the achievement of the learning objectives (Bull and Ma, 2001). In order for the students to be more autonomous and the learning outcomes to get improved, it is necessary to examine the use of language learning strategies (Bull and Ma, 2001).

O'Malley and Chamot (1990), define learning strategies as the special thoughts or behaviors that individuals use to help comprehend, learn, or retain new information. For them, learning strategies are important to language learning because they enhance students' own learning. A similar definition is also given by Scarcella and Oxford (1992: 63), defining the learning strategies as "specific actions, behaviours, steps, or techniques - such as seeking interlocutors, or giving to yourself the incentive to deal with a difficult language task - used by students to enhance their own learning".

It is believed by many in the field of education that the effective use of learning strategies is one of the most important skills that students must acquire in order to succeed in language learning (Gallo-Crail and Zerwekh, 2002). When a student deliberately chooses the strategies that match his/her own way of learning, these strategies become a useful tool for active, conscious, and purposeful self-regulation of learning.

The learning strategies are important to foreign language learning because they enhance the students' own learning, and students use them for active, self-regulated involvement that is important for the development

of communication skills (Oxford, 1990). According to Oxford (2003) learning strategies can be classified into six groups: cognitive, metacognitive, memory-related, compensatory, affective, and social. The main focus of the present case study is on the cognitive strategies (*which relate to how students think about their learning and enable them to manipulate the language material in direct ways*), the memory-related strategies (*which relate to how students remember language*), the social strategies (*which involve learning by interaction with others*) and compensatory strategies (*which enable students to make up for limited knowledge*).

Moreover, both reading and vocabulary are considered to be fundamental to foreign language competence and often constitute the greatest difficulty for learners. This study aims at examining their use of reading and vocabulary learning strategies (and whether an optimum way to deploy learning strategy training exists). With a special focus on a hypertext approach to foreign language reading, content knowledge can be acquired gradually and incrementally through repeated exposures to the various tasks in the game context. This can lead to richer content-specific vocabulary use (efficiency that can be achieved by simultaneous twofold learning-reading and vocabulary), and the more learner-based nature of the foreign language acquisition. For instance, by exposing learners to an amount of unknown geography-related vocabulary, the aim is to attempt to enhance the strategy of inferring word meaning from context, which seems to be ineffectively used by the learners. Besides, Coady (1993) emphasizes the importance of vocabulary building as an integral part of reading, viewing it as a strategic skill, necessary to be included in reading instruction (in Kusumarasdyati, 2006).

3. Case Study

As the new generations are introduced into a digital world, also through computer games, the ways of interaction with the technology change the ways of learning and the production of knowledge. Therefore the main focus of the present study is to explore new teaching methods, in order to enhance the skills needed for the future citizens in a digital society. Furthermore, this could serve as a paradigm of utilizing the children's familiarity with digital technologies, following Prensky's (2001) characterization of them as "digital natives".

Despite the fact that more and more teachers today use computer games as tools for foreign language teaching, the way that learning takes place in the classroom in such an environment has not been sufficiently studied. The present study has exactly this purpose that is to explore ways in which the learning takes place within a system where a computer game has the role of the educational material. More specifically, the purpose of the current case study was to improve sixth-grade primary school students' geographical knowledge and English vocabulary through a combination of GBL and CLIL settings. Moreover, an attempt was made to enhance and identify the learning strategies that students use while learning a foreign language, since their effective use is believed to be "one of the most important skills that students need to master in order to achieve success in language learning" (Gallo-Crail & Zerwekh, 2002: 57).

Taking into account the aforementioned theoretical grounds, a game combining the benefits of GBL and the CLIL methodology was designed, in order to create a learning environment for acquiring geography-related content, using the English language as a medium. The totality of the game-play involved interacting directly with language, mostly through reading and writing. The expected outcome of this case study was for the students to develop the ability to identify information in order to solve a problem, identify resources to be used for gathering information (provided by the QR Codes), make decisions, analyze and present solutions in a written form. Students were also encouraged to engage positively in the learning process by directing their own learning, by being active, reflective and critical learners, by extending learning beyond the presented situation into new areas whereby some transfer of skills, abilities, knowledge and strategies may take place.

3.1 Game Description

This section of the paper focuses entirely on a more thorough description of the game itself, as the didactical concepts, the design principles and the game's technological platform have already been analyzed (Dourda et al, 2012).

"*Whodunit*" (for "Who done [did] it?") is a plot-driven, web-based detective game, suitable for 11-12 years old students. The game is structured around six stations/levels (landmarks around the globe) in the form of missions, which comprise hypermedia learning material and relevant questions of progressive difficulty levels. In each mission, the students have to solve a number of problems, presented to them as open-ended questions. The learning material encompasses websites with texts and images, relevant to both geography and a detective story. To successfully complete the game, students have to accomplish all six missions and to collect all clues that the suspect leaves behind. They are initially placed in their hometown (realistic context), where they undertake the role of a detective, following the traces of a notorious criminal, Mr. X. Within each level, the detective should correctly answer all the questions - sent to the Chief's e-mail or written on paper - posed to them, gaining the corresponding points in order to obtain a special key, granting them the right to proceed to the next level. The final goal is gather all the clues and the necessary information about Mr.X's identity, thus arresting him by travelling at the location he is hiding in. The character design and narrative environments of the game were constructed in such a way as to foster students' intrinsic motivation and sustain their persistent participation in the game playing process.

The game is entirely web-based and consists of three different sites – the Diary, the Chief's office and the Internet. The Diary is the place where the detective writes information about Mr. X's moves, gathers important evidence about his identity and describes the geographical location and the natives that inhabit this location (Figure 1).

Figure 1: Screenshot: Detective's Diary – Investigation in the Amazon Rainforest

The Chief's office is the place where the detective informs the Chief via letters, e-mails, telegrams, post cards etc. about Mr. X's whereabouts, provides the evidence gathered and the clue for the next location to be investigated (Figure 2).

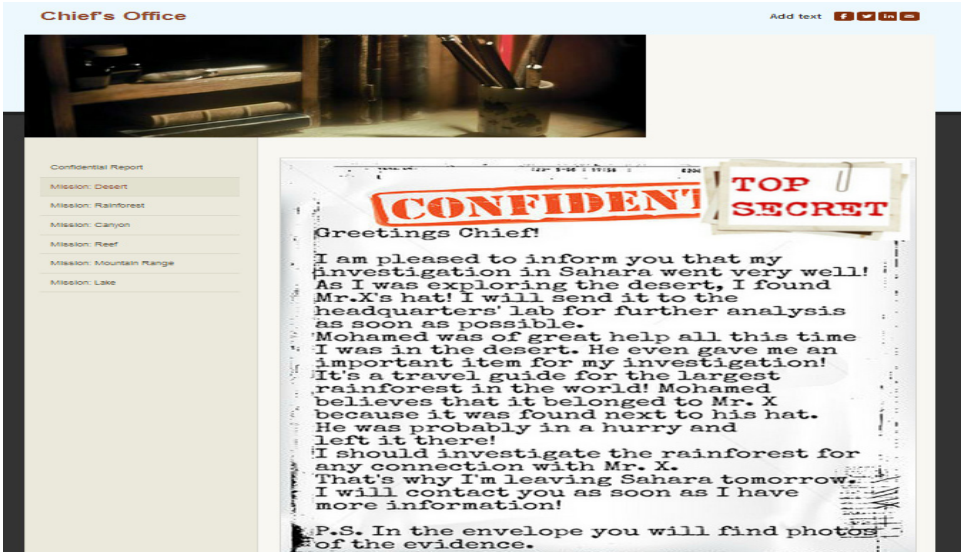

Figure 2: Screenshot: Chief's Office – Letter to the Chief

The Internet refers to the site where the detective searches for information about the geographical location he/she is going to travel next (Figure 3). Each time the students investigate a specific location, they take the opportunity to refine their search by gathering information about the geographical position, the climate, the local people as well as the flora and fauna of each location.

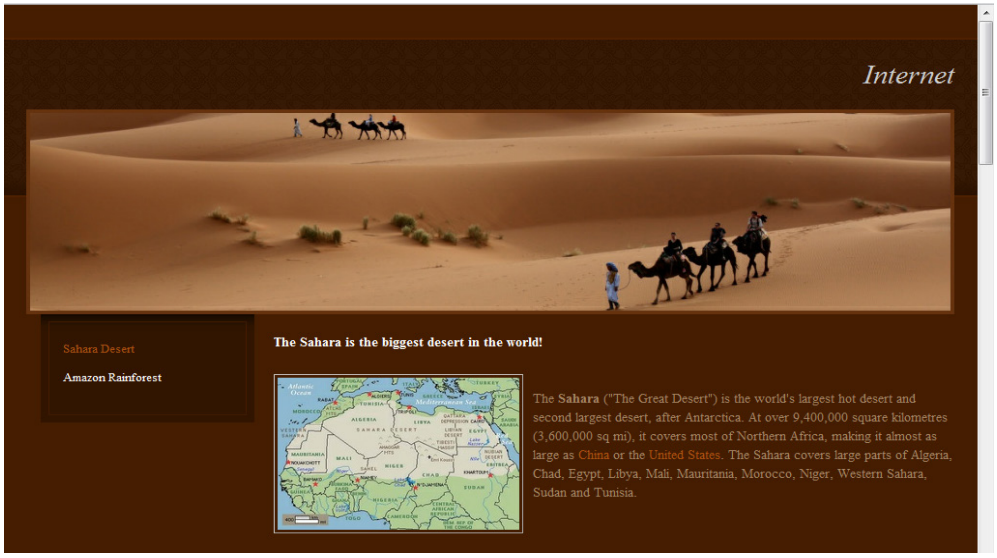

Figure 3: Screenshot: Internet – Information about the Sahara Desert

The main goal of the game is to follow the track of Mr. X around the world, provided by clues hidden in QR Codes. This allows the students to "travel", visiting famous geographical sites/locations and world attractions: the Sahara Desert, the Amazon Rainforest, the Grand Canyon, the Great Barrier Reef, the Himalayas and the Caspian Sea (Figure 4).

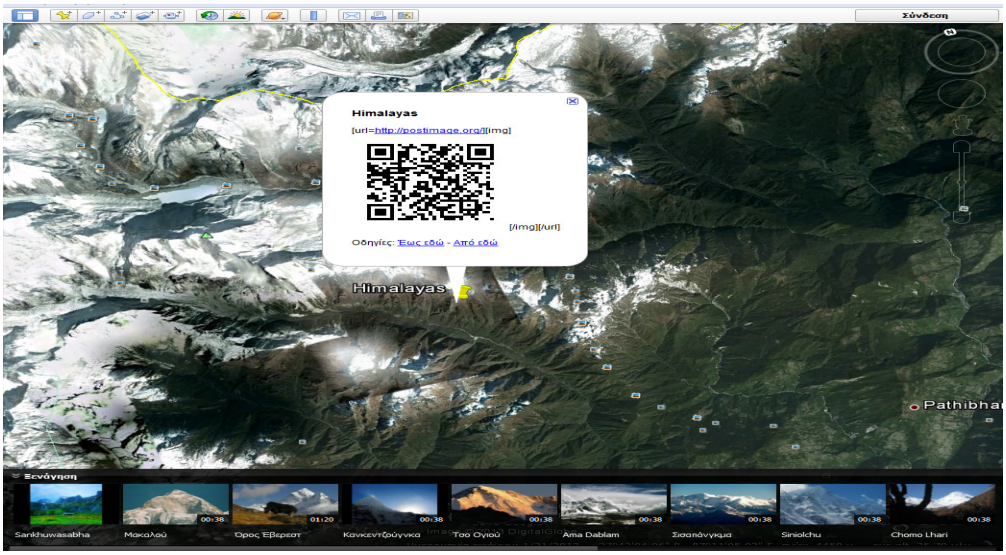

Figure 4: Screenshot: Himalayas Mountain Range - QR Code hint pinned on Google Earth

The location clue discloses the whereabouts of Mr. X, implying his next trace around the world. When the information is clear to the students, they can search the location on Google Earth and find the pinned QR Code that leads them to the appropriate website with further information. However, if the information is indirect and the students are unable to recognize their next destination, the QR-Code hints help them find the precise location.

In the various locations, students need to conduct some detective work in order to unveil the trace of Mr. X. Through investigating each location and with the help of the natives, important information is collected and listed in the clue log (Diary). The narrative frame of the game invites engages the students in a challenging, English speaking world. In this sense, English is learned through a way that is not unfamiliar to the students, but allows them to participate on a confident basis in the game. As described in section 2.2, by conducting all the prescribed activity in the foreign language, students are able to obtain larger vocabularies of subject-specific terms display "greater fluency, quantity and creativity and show the kind of higher risk-taking inclination often associated with good language learners" (Dalton-Puffer, 2002). The game provides a familiar and motivating context for the learning activity.

Moreover, students can visit their journals, created for the game, to check and review the cases and the various evidences. By writing in a journal students will be able to assess their own activities, to see how they are doing and to evaluate their decisions and actions (metacognitive awareness) (Figure 5). Students/players level up by solving the mystery cases, investigating more clues, and hunting for Mr. X around the world. Additional rewards will be offered after accomplishing various tasks.

Figure 5: Screenshot: An example of a team's journal

3.2 Research Methodology

The presented case study immersed seventeen (17) students (9 girls and 8 boys) from 11 to 12 years old attending a Greek Public Primary School of Thessaloniki in problem solving challenges. Students, who were chosen randomly, were engaged in eight-week collaborative work (5th February, 2013 – 29th March, 2013), involving six levels of gameplay.

First a survey of both students' digital habits and learning preferences was conducted to establish a contextual baseline on which to place the study. The survey indicated that all the students were computer proficient and frequent users of computer games. Moreover, for the purposes of the study a knowledge test - consisted of 30 true/false (e.g. "*The Sahara Desert is in Asia*") or multiple-choice (e.g. "*Which river runs through the Grand Canyon?*") questions to measure students' performance in geography and English vocabulary - was conducted by the researcher according to the requirements of the educational game. The knowledge test was completed twice, once before the implementation of the game and once after it had been completed. The researcher used the same pre- and post-tests to ensure the reliability of the test in terms of format, content and cognitive levels. After the implementation of the game, a satisfaction/feedback questionnaire was also distributed to the participants. The questionnaire included nineteen (19) Likert scale questions and three (3) open questions, in order to investigate the extent of students' satisfaction with the game, their overall views of the application and any proposals for improvement.

After the pre-test, the researcher introduced the game to the students and asked them to form groups of three (one team only consisted of two members). Each team member undertook a role, such as the manager, the computer user, and the journal keeper. The students were informed that the game process involved 45 minutes of instruction and one hour of playing. Instruction consisted of multimedia presentations (*Prezi*), in order for them to be introduced to each game level's content and familiarized with the relevant geographical knowledge and unknown English vocabulary, necessary for them to proceed with the game. The instructive session was implemented in a game-like format that seemed to motivate the students. After each instruction, students accessed the game online in the school computer laboratory.

By completing each game level, the students were asked to respond to various complex tasks whose purpose was to assess and evaluate their content and language knowledge. Students' evaluation began after each game session, including a variety of complex tasks that emerged students to write (on paper or online) e-mails/letters and conduct reports, describing their experience from each mission around the world, either by the detective's or the indigenous inhabitant's perspective. Other tasks also required from the students to record a video of themselves talking in English about their progress in the game, and even communicate through a message application on a mobile phone with the Chief (Figure 6). In that way, it was possible to obtain immediate data about their performance in Geography, their improvement in English vocabulary as well as reading and writing skills and, moreover, the various language learning strategies they used.

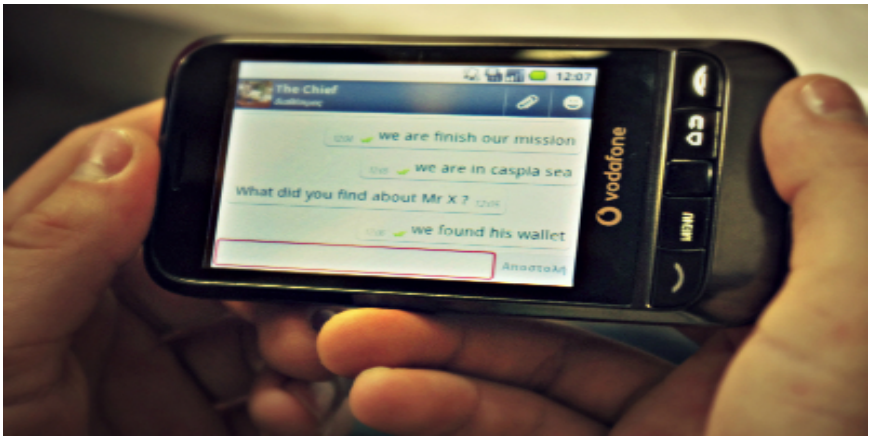

Figure 6: Screenshot: An example of a post task (evaluation)

3.3 Research Hypothesis

The research hypothesis is that the implementation of such a teaching approach will have the following beneficial influences on the students': (a) geography knowledge, (b) English vocabulary,(c) reading skills, (d) the use of foreign language learning strategies, (e) collaboration, (f) satisfaction with the game.

4. Results

In this part of the paper the data collected throughout the case study are presented. The processing and analysis of data has helped to provide answers to the research questions raised above.

Through the game the playing process became a "serious" activity and the students achieved both the game and the learning objectives. The results are based both on acquired quantitative and qualitative data. Student's familiarity with the computer (games), their satisfaction with the game and their language learning preferences were collected through questionnaires (quantitative data). To export results with regard to the content of geography and the vocabulary in the English language the two cognitive tests were compared (pre- and post-test), as well as the writings of pupils' journal and the game logs (quantitative data). As far as the pupils' reading skills are concerned the game logs and, in particular, the observations were taken into consideration (qualitative data). Finally, student's use of learning strategies was obtained through observation, the researcher's and students' journal, video recording as well as through the various tasks the students achieved after each gameplay (qualitative data).

4.1 Student Learning Outcome

The first research question examined the difference of students' performance in the pre- and post-test in terms of content knowledge. Via the educational game, the students appeared to be led effortlessly to

knowledge, giving particular emphasis on the geographical content which they considered to be an essential and integral part of the game. Comparing the two cognitive tests (pre- and post-test), results show that students' content knowledge was considerably improved.- All students without exception showed higher scores in the second test (post-test) as compared with the first one (pre-test) (Figure 7). More specifically, the average percentage of students' positive progress in the knowledge tests was approximately 30%. No significant difference was found among the participants, in correlation with their familiarity with computers, as they were all computer proficient.

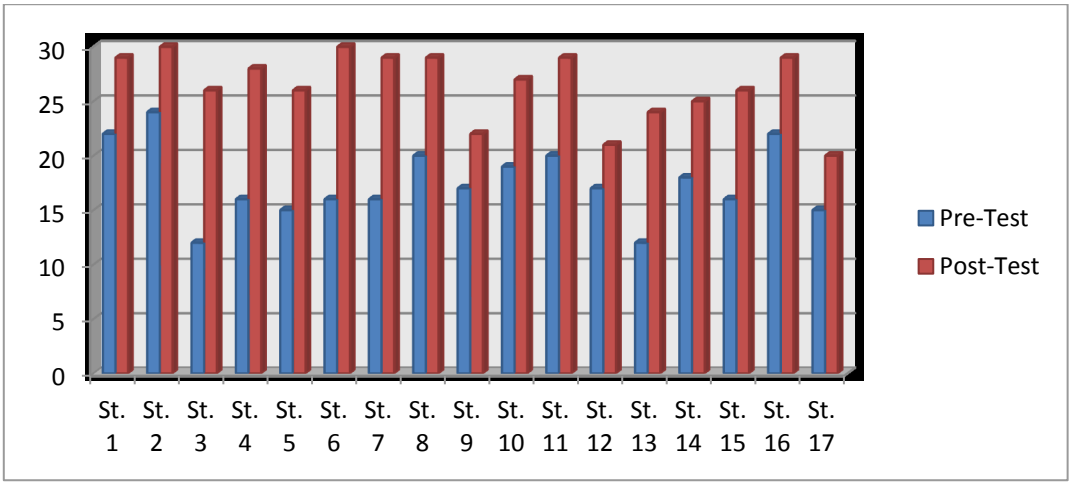

Figure 7: Total Correct Answers per Student in pre- and post-test

Moreover, it was observed that during the completion of post-test, none of the students made any certain clarifying questions regarding to the content of the cognitive test. Additionally, none of the students responded at random to any of the questions appeared in the test, which can be seen by comparing the total number of correct answers (Figure 8).

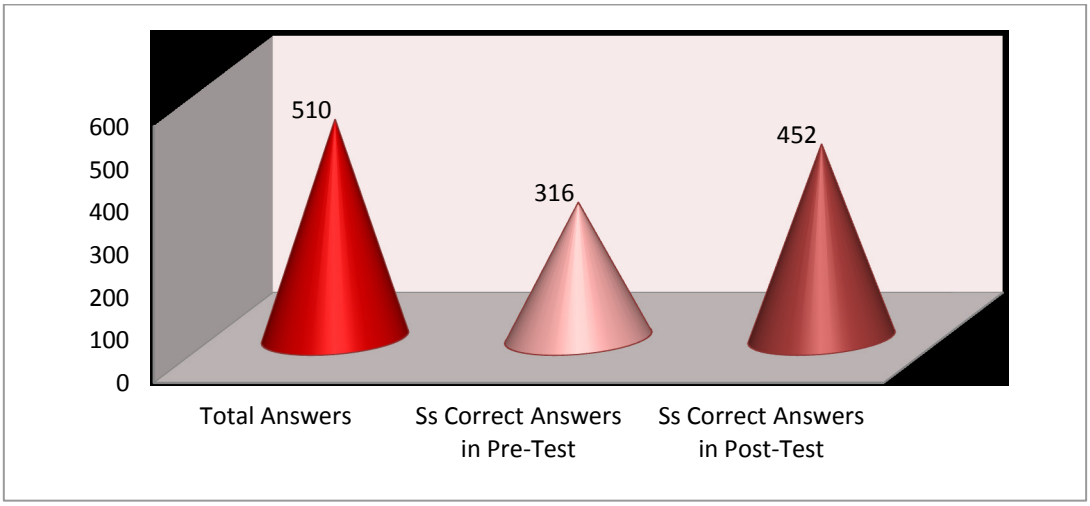

Figure 8: Students' (Ss) Total Correct Answers in pre- and post-test

As far as the second research question is concerned, qualitative data obtained through observation, journals, video-recording and evaluation tasks, showed that students' vocabulary was improved. Analysing the texts in their journals and the various post-task and gaming activities, it became clear that the children used an abundance of new and difficult words in the English language (Figure 9). The researcher also noted the fact that students completed the post-test without asking for help in order to understand the meaning of some

questions or answers, as opposed to the pre-test, where they faced difficulties due to the number of unknown words.

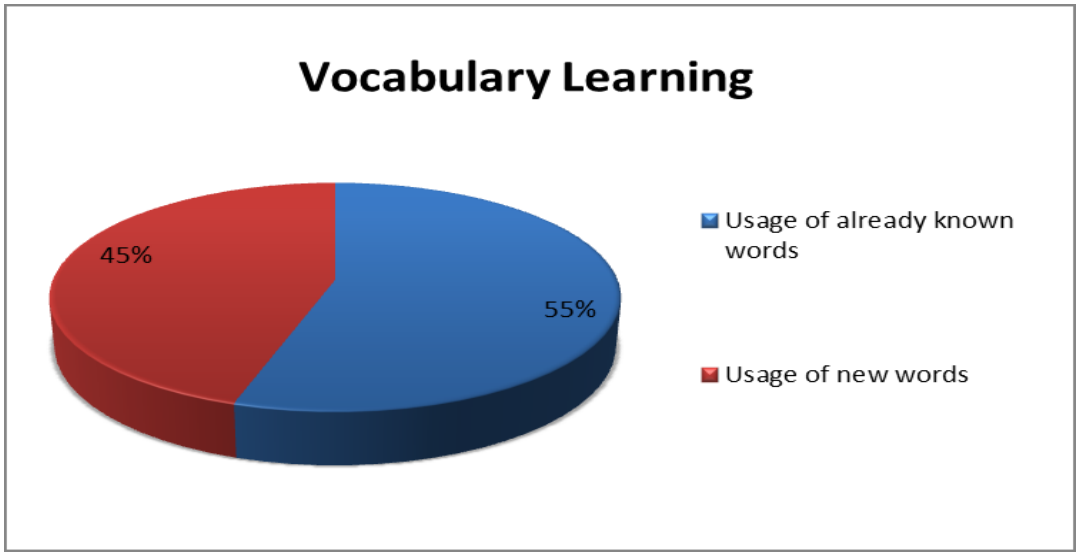

Figure 9: Students' vocabulary use throughout the game

It also needs to be highlighted that the students spelled correctly the various words they had learned when they wanted to produce written texts, which indicates an efficient way of learning vocabulary.

It is also worth mentioning that throughout the game and the post-stage, the students faced the various tasks as if there were a part of the game instead of an additional work for their English language subject, without even having the fear of making an error. Consequently, they did not connect the various activities with the traditional way of learning a foreign language, and as a result they let their imagination free and produced authentic texts by using words they met or they had already known. In addition, it was noteworthy the fact that the students in their efforts to gain a higher score in the game and acquire the key for the next level, were trying to use the words they encountered in the various texts, and especially the difficult ones. In consequence the game provided the students with the motives to learn on their own, without being asked directly, new and specialized vocabulary in the English language.

As far as the students' reading skills are concerned, data was collected mainly through observation, with the help of video recording and the researcher's journal. Results showed that through the continuous exposure to the texts of the game students' reading skills – improved considerably. . While in the beginning of the game most students were facing difficulties in reading comprehension and preferred a more hasty and careless reading, in the course of the game they appeared to understand the texts to a large extent. In an extent, this is due to the students' continuous exposure to English language texts throughout the game, which they had to comprehend in order to provide answers to the various questions and proceed in the game.

It is also worth pointing out the various reading strategies the students used during the game. The use of the reading strategies was enhanced, as it became apparent a considerable difference between the first (1^{st}) and the sixth (6^{th}) level of the game (Figure 10). Initially, an increase in the students' use of memory strategies, was observed. More specifically, in the first (1^{st}) level of the game five (5) out of the seventeen (17) students created mental linkages by trying to associate the new information with another one or with concepts they already knew. On the contrary, in the sixth (6^{th}) level of the game the students' percent that made use of this specific strategy was increased to 65 (%). Similarly, it was noted an increase of 36% in the number of students that used imagery by trying to correlate the images with the words found in the various texts, in order to understand them better.

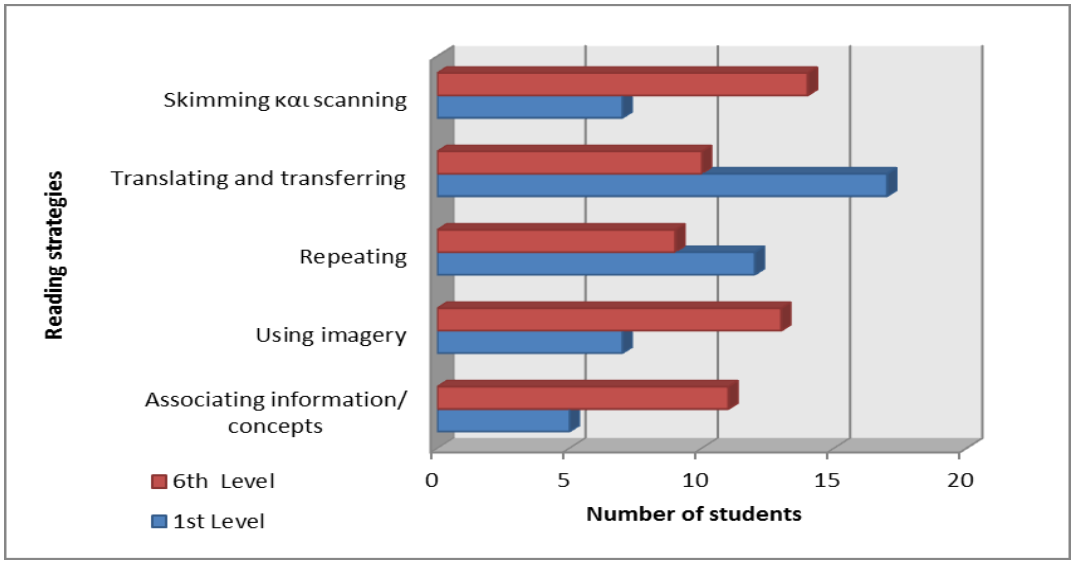

Figure 10: Students' reading strategies in the 1st and 6th level of the game

In addition, it is interesting to note that students used widely some of the cognitive strategies while reading the texts in the game. Specifically, the percent of students that used repetition while reading, was decreased in the sixth level to 18%. It is likely that this occurred because, although in the beginning students read the texts more than once in order to comprehend them, at the end of the game comprehension seemed a lot easier, probably due to the less unknown words. A decrease of 41% was observed during analysing and reasoning, as some of the students in the sixth level stopped using the translation and transfer of knowledge and structures from their mother tongue in order to understand and produce an expression in the foreign language. This result is encouraging, as it reveals the familiarization of students with the English language structures, without the need of connection with those of their mother tongue.

Finally, an important increase (50%) was observed in the percent of students that used the strategies of skimming and scanning in order to understand the basic idea of the texts and to detect important information. More specifically, although in the first level of the game only 7 out of 17 students seemed to master these strategies, in the last level of the game 14 studentsstarted scanning for information, inferring word meaning from the context and as they progressed in the game they overcame any hindrance in the form of unfamiliar words.

4.2 Student Language Learning Strategies

The study also focused on identifying the learning strategies used during unintentional vocabulary learning. Moreover an attempt was made to assess the relationship between strategy use and vocabulary performance. As far as vocabulary learning is concerned, results indicate that certain learning strategies are more effective in acquiring new vocabulary words and that students have preferences in the strategies they use to learn these words in the foreign language (Figure 11). Data was collected through questionnaires, video-recordings and the researcher's journal.

More specifically, 65% of the students (11 out of 17 students) preferred and used the memory strategies throughout the game. Students tended to retrieve information and understand unknown vocabulary via creating mental linkages, associating unknown with known words and using their imagination. For example, most students that recognized a familiar word in the foreign language, tried to simulate its sound with that of their mother tongue.

Cognitive strategies were used by the 76% of the students (13 out of 17 students), and mainly by skimming and scanning in order to find information in the texts and translating them into their mother tongue. During the learning of new vocabulary, 3 out of 6 teams made use of resources for receiving and sending messages, such

as search engines (e.g. Google) and online dictionaries. Another cognitive strategy used by all teams in the study and found mainly in the written texts, was the recombination of already known words in order to form larger and more complex sentences. Finally, all six teams kept notes in their journal not only during the instruction stage but even during the gameplay, and as a result the learning of new vocabulary was enhanced. It is worth mentioning the fact that the teams that kept more notes and continuously updated their journal were those that displayed higher motivation in the game.

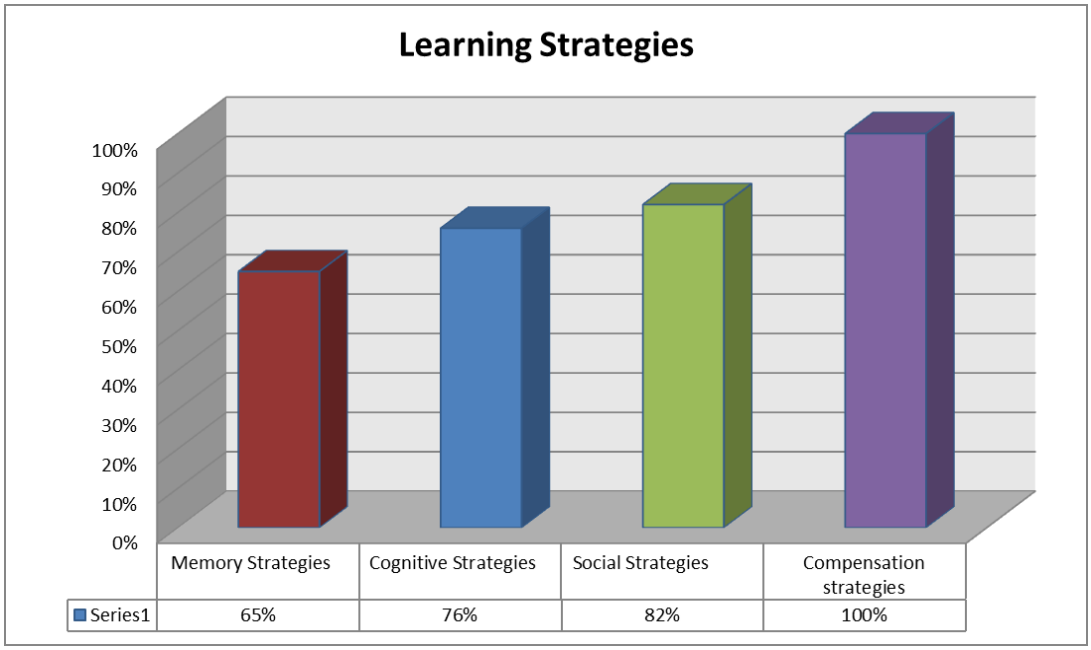

Figure 11: The language learning strategies students used in the study

Social strategies were preferred by the 82% of the students (14 out of 17 students), as most of them were motivated to cooperate with their peers in order to achieve a common goal in completing the game successfully. They were also often asking questions for clarification or even correction both to their peers and the researcher.

Compensation strategies, which were mainly noted in the researcher's journal and video recordings, were widely used by all the students in order to overcome their limited knowledge in English. In particular, 10 out of 17 students preferred to use gestures or facial expressions so that they could communicate with the members of their team or with the researcher. The creation of a new word (coining words) occupied the 11% of the compensatory strategies used by the students, while the use of a circumlocution or a synonym was at 19%. Moreover, 12 out of 17 students were using clues in order to guess the meaning of what they were reading. It is notable that all 17 students were frequently asking for help either by their peers or the researcher, as well as often switching to their mother tongue.

4.3 Student Collaboration

Allowing students to collaborate with peers is another issue, explored in this study. As students worked in groups, they were actively responsible for their own learning processes. Information retrieved from observation, the researcher's journal and video-recordings showed that students engaged in collaborative learning, enhanced problem solving skills and critical thinking, they learned to work in a group and became autonomous learners. The game process engenders teamwork, communication and collaborative spirits among the students. None of the teams identified a team leader, but instead all members acquired a role, such as that of the computer operator, the manager and the journal keeper. There were only a few occasions when they were asking for the researcher's guidance, as they preferred to solve any problem or difficulty on their own.

It should also be mentioned that the cooperation was considered by the majority of the students as one of the most positive aspects of the application. Some of them wrote characteristically on the feedback/satisfaction questionnaire:

Student 1: "I collaborated perfectly with my schoolmates!"

Student 7: "I enjoyed teamwork"

Student 12: "Collaborating with my friends was great!"

Student 17: "It was very nice that we had to work together in the game"

4.4 Student Satisfaction

Furthermore, after the interventions, students' views on the application they had used were elicited through a feedback/satisfaction questionnaire (Figure 12).

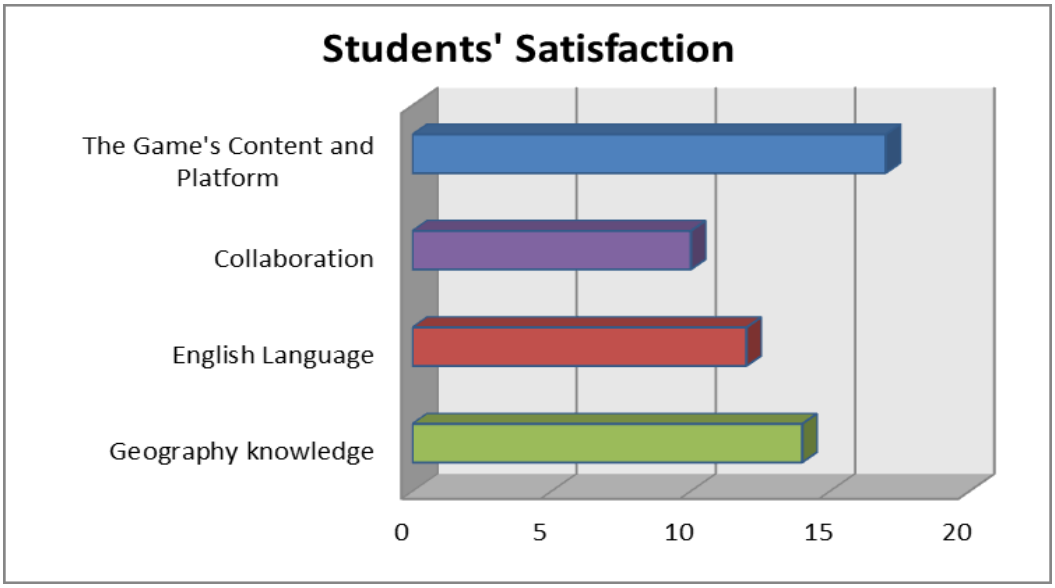

Figure 12: The number of students in relation to their satisfaction of the application

All students reported satisfaction and enjoyment from their engagement with the game and commented that they were able to learn through playing. Over 60% of the students commented that the game improved their knowledge in English and Geography and almost 80% found the game challenging, interesting and exciting. In addition, 10 out of 17 students reported collaboration and teamwork as one of the most positive aspects of the game process. Moreover, according to researcher's journal, throughout the whole gameplay, students were drawn to the game, especially to its attractive illustrations.

5. Conclusion

This paper has suggested a game-based concept for teaching a foreign language based on a case study implemented in a Greek primary school. The results suggest that the use of foreign language learning strategies as well as the geography-related content were facilitated and improved. In addition, reading skills, lexicon, motivation and collaboration were enhanced.

The reason that this game was selected for the described approach is the fact that it includes authentic material with a meaningful purpose, no confusing graphical interface or complicated control schemes. Instead it utilizes technological tools (such as Google Earth, QR Codes and websites) that can be easily manipulated by educators without any specific technological knowledge. Moreover, it can be applied in all levels of education in order to teach a variety of subjects and enhance a range of learning skills. Therefore it comprises an ideal educational tool to be implemented in a range of different learning contexts and used for a variety of teaching

purposes. Thus this paper can also operate as guide for educators, willing to apply such approaches and techniques in their classes but are not very technically competent. The core idea is a game approach, based on an idea which is close to the students' interests, enriched with authentic and meaningful content, within the context of the subject to be taught.

Another important issue implied by the present study is that the less advanced students benefited from the game. Although Egenfeldt-Nielsen (2005: 221) states that "the best students were capable of connecting the two modes – playing and learning – whereas the least successful don't make this connection", it should be highlighted that there should be more explanation given in relation to this conclusion. The present study showed that there were students who were not very advanced, but who thanks to the game, were able to implicate themselves a great deal in the learning activities.

Furthermore, an important issue that is implied through this paper and should be taken into serious consideration is the urgent need to change teaching methods in order to enhance the skills that future citizens will need in a digital society. According to Prensky (2005) teachers should learn to use computer games as tools that provide engaging and effective learning experiences for students. However, teachers with little experience in the use of computer games are reluctant to use them (Gros, 2007). For this reason, it is important to design guides that can explain the merits of games to teaching staff and enable them to use them in a way that is oriented far more towards the acquisition of the knowledge required by the school curriculum (Gros, 2007). However, it should be taken into serious consideration that there is a series of basic issues that should be investigated not only from the point of view of educators but also by the computer game designers. For example, an important issue of computer games to be investigated is the time that is necessarily required to produce an activity. Generally, the games require many hours and, on occasion, it is difficult to establish the sequences of play that should be significant for both the students and school curriculum. In this sense, the most efficient thing to do is to let students continue to advance their knowledge of play outside the classroom, via the provision of access to the game in the school.

Finally, the aforementioned game concept developed can be seen as a template where different instructors can introduce different knowledge and contexts to apply game-based learning for their particular subjects and specific learning goals. Moreover, in implementing, but also researching CLIL, the focus usually lies on 'typical' school subjects fostering cognitive learning. Future work can also be carried out to foster others forms of learning. Apart from that, most research on CLIL is concerned with primary and secondary education. As recently GBL has also been proposed for adult education, a new form of interactive content is worthy of exploration for learning purposes. Last but not least, future work includes the transformation of the aforementioned game into a more interactive one, perfectly suited for additional speaking and listening activities and grammar-focused activities through the implementation of post-playing tasks designed around the content of the game.

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