The Students' Perceptions of Digital Game-Based Learning

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Abstract: This paper provides a critical analysis on the rationale behind the utilisation of educational technologies, including; digital learning resources. A qualitative research sheds light on the students' discernment and preconceptions toward the use of digital games, stories and simulations, in-class. Semi-structured, face-to-face interview sessions among secondary school students suggest that students are increasingly acquiring skills and competences from blended learning. Their engagement with educational applications (apps) is improving their critical thinking as it helps them make evaluative decisions to solve problems. At the same time, the results reveal that most of these students are developing their interpersonal skills as they collaborate in teams and work in tandem with their peers, during their formative activities. However, there are also a few students who are not perceiving the usefulness and the ease of use of playing digital games at school. This study postulates that students seem to possess dissimilar skills as they exhibit different learning abilities. The students' gender, age as well as their position in the social strata could possibly influence their disposition to engage with others. These findings imply that practitioners in education ought to consider taking an iterative approach as they identify what, where, when and how digital games are (or are not) consistent with the courses' learning outcomes and curriculum programmes. In conclusion, this paper opens-up some avenues for future research in the promising field of digital game-based learning.

Keywords: Blended Learning, Technology in Education, Digital Games, Digital Game-Based Learning, Games, Digital Stories.

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1. Introduction

Today's teenagers and adolescents are spending a considerable amount of their leisure time online (Kapp, 2012). Very often, they play games on mobile devices, including; tablets or smartphones. These developments have inevitably led to a new paradigm; as learning-via-play or digital game-based learning have changed the way how students think and process information (Pivec, 2007). The students are increasingly acquiring knowledge and skills in an informal manner as a many applications (apps) are responding to educational requirements and training needs.

Although, it may appear that digital game-based learning is still far from mainstream, this paper reports how several researchers have already been investigating the costs and benefits of digital games (Pivec, McDonald and Garcia-Panella, 2016; Graesser, Chipman, Leeming and Biedenbach, 2009). Notwithstanding, there is potential for further development of game-based learning environments, across a broad range of curricula. Indeed, interactive environments can incorporate effective problem-solving episodes with highly engaging learning experiences for students. In fact, "action" video and computer games may have a positive effect on students as it enhances their visual selective attention among other benefits (Green and Bavelier, 2003).

In this light, this contribution critically evaluates the utilisation of digital games as plausible learning technologies in education. Moreover, it considers how such innovative apps can (or cannot) support curricula and their intended learning outcomes. This qualitative paper explores the students' opinions, beliefs and perceptions on the use and ease of use of digital-learning technologies in education. It advances theoretical underpinnings on digital-learning games and puts forward an empirical study that was duly carried out in a secondary level educational setting. The over-arching aim of this research was to identify and to analyse the determinants which explain why students are (or are not) engaging themselves in digital technologies. This study was built on the foundation of the following research questions:

- What are the students' opinions on the use of digital learning games in formative assessments?
- What are the pupils' insights and perceptions of extant digital tools, resources and instruments that are currently being utilised in-class?
- What are the students' recommendations to educators, in this regard?

2. A Benefit-Cost Analysis on the Use of Game Technology in Education

2.1 Benefits

Students are increasingly using their own computers to access course content online. Whether learning happens though formal or informal routes, it is very likely that tomorrow's students will have to continue using technology in their future employment. Therefore, it would make a lot of sense if educators use virtual learning environments including digital games, stories and simulations as a vehicle to instil knowledge, skills and competences to their students (Winterton, Delamare-Le Deist and Stringfellow, 2006). This reasoning suggests that there is an opportunity for those students who intend using digital media to learn theory and concepts. They can acquire tacit knowledge through relevant experience of performing certain tasks (Camilleri, 2017a). Students enhance their skills over time, particularly if goal-directed, in response to some demand in the external environment (Winterton et al., 2006,). As a result, they become competent in their tasks as they capture skills and dispositions beyond cognitive ability.

The ccompetencies that are acquired through digital technologies are fundamentally behavioural in nature, as they are susceptible to self-awareness, self-regulation and social skills. Digital games promote collaboration, problem-solving and communication, experimentation and the exploration of identities (Plowman, McPake and Stephen, 2010). The students' desire to win or complete games could motivate them to study course-related materials. When they win rounds of the game, they may achieve learning outcomes. Mayer and Johnson (2010) maintained that a digital environment should comprise (i) a set of rules and constraints, (ii) a set of dynamic responses to the learners' actions, (iii) appropriate challenges enabling learners to experience a feeling of self-efficacy, and (iv) gradual, learning outcome-oriented increases in difficulty. Kapp (2012) held that the use of digital games in education necessitates standardised curricula that promotes competition, achievement and reward structures. Kapp (2012) maintained that the provision of quality learning within preschool environments has considerable potential to add digital capital to students. Nolan and McBride (2014) posited that without play, education becomes a force of compliance, not intelligence. Arguably, it is in the interest of all stakeholders in educators to develop meaningful and inclusive critical pedagogies that integrate digital teaching resources with traditional teaching methods.

Games can improve attention spans, focus and reaction time of players (Boot, Kramer, Simons, Fabiani, and Gratton, 2008). They can help kids develop adaptive emotion regulation (Granic, Lobel & Engels, 2014) Fleming, Wood and Debra (2001) noted that there was a significant increase in positive mood after playing the violent game. They also suggested that there was no significant increase in aggressive mood scores for either boys or girls after playing violent games. Other research has indicated that gamers are able to translate the prosocial skills that they learn from co-playing (or from multi-player gameplay) to their peers and family members beyond the gaming environment (Ventura, Shute and Kim, 2012). Very often, students are usually motivated to review their knowledge and understanding of something they have just learned (Shulman, 1987). They may do so by exchanging their knowledge with one another. Hence, the gaming environment may provide the right setting that allows two-way communication through instant feedback between instructors and students. Moreover, game-based learning may be accompanied by insightful discussions and social activities (Kapp, 2012). This way, educators can easily monitor the students' progress in a timely manner. Specifically, games constitute powerful learning environments for the following reasons:

(a) they can support multi-sensory, active, experiential, problem-based learning;

(b) they favour activation of prior knowledge given that players must use previously learned information in order to advance;

(c) they provide immediate feedback enabling players to test hypotheses and learn from their actions;

(d) they encompass opportunities for self-assessment through the mechanisms of scoring and reaching different levels;

(e) they increasingly become social environments involving communities of gamers who may be either playing remotely or collaboratively in educational setting;

(f) Apart from knowledge acquisition, game playing can also favour the development of various skills, such as critical thinking and problem-solving skills (Camilleri and Camilleri, 2017a,b; Erhel and Jamet, 2013; Papastergiou 2009; Pivec, 2007).

2.2 Costs

Fleming et al. (2001) reported that educational games and simulations have revealed that only nine studies have pointed to an improvement in learning quality when compared to conventional lessons. Moreover, they found that just four out of 16 studies concluded that this medium increases motivational investment. Girard, Ecalle and Magnan (2013) admitted that they were not in a position to conclude that educational games can have a positive effect on learning and motivation. Some researchers believed that these stances against the use of digital games have stemmed from a range of different factors, including; individual learner characteristics (Vogel, Vogel, Cannon-Bowers, Bowers, Muse and Wright, 2006); the learning situation and the specificity of certain subject areas (Papastergiou, 2009). Apparently, academics were reporting contradictory results that were essentially ascribed by different methodologies (Mayer and Johnson, 2010). In fact, many authors have often adopted media comparison approaches by measuring the learning outcomes of people who played educational games against the learning outcomes of users who were learning through conventional media (Oblinger, 2004). Evidently, such methodologies were vulnerable to many confounding factors including; the format of educational content and the teachers' social presence, among other variables. To avoid these methodological limitations, Adams, Mayer, MacNamara, Koenig and Wainess (2012) have adopted the value-added approach which essentially involved a critical analysis of the learning outcomes of educational games.

Many people are still wary of electronic innovations in a context where digital games are continuously changing and evolving at the speed of technology. Some individuals argue that digital games can make hyperactive, violent, stupid and anti-social children (Gallagher, 2004). Moreover, there may be educators who may still prefer "old teaching" methodologies rather than using the latest, interactive learning resources (Camilleri and Camilleri, 2017a; Yee, 2006). Nolan and McBride (2014) noticed that policy and funding constraints were often cited as barriers to technology integration in early childhood learning centres. However, they went on to suggest that these problems are also dispositional as digital games and technology are often considered as a peripheral priority for many educators. Nolan and McBride (2014) maintained that early childhood instructors may be averse toward the digital culture as they often resort to outdated pedagogical and developmental standpoints. Therefore, the legitimacy of digital game-based learning in education ought to be critically analysed and re-examined in different settings. Graesser et al. (2009) hinted that digital game-based learning environment can impose considerable constraints that "make it

extremely difficult to integrate deep content, strategies, and skills" (p. 12). Juul (2009) contended that challenging games add content. He maintained that failure in games is central to the experience of learning and to improving skills. Nevertheless, there may be children in our school who may not engage or respond to extrinsic, technical games as they may not regard educational games as play. It may be irresponsible to postulate that children with different abilities will readily embrace the digital culture that is being fostered in education.

Although the classroom practitioners may exhibit an intrinsic personal interest in digital gaming, they may have limited opportunities to develop their digital literacy. Alternatively, they may not possess scarce resources to incorporate interactive games into their lessons. Educational leaders may not realise that their teachers require investments in infrastructure as well as appropriate training and development for the successful implementation of digital learning resources in education (Camilleri and Camilleri, 2017a).

3   Methodology

The researcher has organised purposive, face-to-face interview meetings with forty-one students at St Clare's College in Malta. The researcher obtained the participants' and their parents' informed consent and was committed to protect their confidentiality and anonymity. Therefore, this research project safeguarded the welfare of vulnerable participants particularly those students with learning difficulties. All informants were treated fairly and within an ethic of respect and freedom from prejudice.

The students who participated in this research were expected to share their opinions in great detail. Therefore, the research questions were formulated in such a way where the interview was conversational. An effort has been made to induce the informants to talk freely and openly to gain a good understanding of their perspectives of educational games. There was a fruitful discussion with all of the students who participated in this qualitative study. Evidently, the right questions have encouraged the participants to share their views and experiences about the subjects being discussed. Open-ended questions have allowed the researcher to take advantage of any unexpected issues, especially when the participants themselves were keen to elaborate further. The students were given the opportunity to voice their perceptions and beliefs on the use of digital resources, including electronic games and stories in their classroom. The interviewer's guiding questions are reported in Appendix A.

The qualitative method allowed the researcher to follow up interesting leads and investigate motives. Interestingly, non-verbal cues, facial expressions and gestures have also helped the interviewer to better understand the verbal responses. Admittedly, the semi-structured interviews have allowed the researcher to collect rich and revealing information, yet this technique was time-consuming as it required a lot of preparation and commitment (Creswell, 2003). During the face-to-face interviews, the research participants were encouraged to expand on issues and to clarify their points. Their views, impressions and opinions were annotated in reflective memos and / or recorded on tape. Regrettably, there were a few informants who felt uncomfortable being recorded. This stratagem was deemed important to enhance the robustness and rigour of the gathered data (Lincoln, Lynham and Guba, 2011). The face-to-face interviews gave the opportunity to obtain the individuals' own in-depth interpretations, perceptions, experiences and practices in the form of transcripts. NVivo's qualitative software was chosen for its functionality and ease of use. This software has enabled the coding and analysis of textual and audible data.

4   Analysis

The interview meetings were held with students who were in forms 2, 3 and 4 of their secondary education. These sessions have provided an opportunity to observe (i) the general physical setting - including ICT amenities in their class rooms (and in other areas); (ii) The schools' communication tools – their websites, blogs, internal newsletters, notice boards and (iii) the students' behaviours.

Following a brief introduction, the students were invited to give details of how they were using digital resources in their classroom. The aim of the interview was to discover whether digital games were considered as a strategic tool that could entice the students' motivation and curiosity in academic subjects. At the same time the interviews have revealed the students' access, perceived use, ease of use, and usage intensity of digital technologies, including; apps on tablets and smart phones. The students were also given the opportunity to provide recommendations in this regard.

4.1 Internet Usage in Education

The qualitative findings were arranged by the main themes that have emerged from the data analysis. The students maintained that they utilised digital games during formative assignments, group learning tasks, peer assessments and team-work activities. All

interviewees declared that they had access to the internet at school. Thirty-eight participants held that they also had a broadband / internet connection at home. Thirty-nine students asserted that they browsed the internet on a daily basis. The students suggested that they often used tablets or smart phones to access internet for many purposes. Moreover, the older students hailing from Forms 3 and 4 admitted that they preferred the use of mobile (smart) phones. There was not a clear distinction in the activities undertaken by males and those undertaken by females. The majority of students from this sample affirmed that they played games and watched TV or videos over the internet. Generally, both male and female students admitted that they were engaging in social networking and online chatting through Facebook, Snapchat and Instagram with friends. although there were a few exceptions. Many students posited that there was potential for further usage of internet and the utilisation of digital technologies in education.

4.2 The Perceived 'Use' and 'Ease of Use' of Educational Apps at School

The participants mentioned specific smart phone apps that are also available on tablet technologies. For instance, S6, S7, S10, S11, S19, S33, S35, S37, S38 and S40 suggested the use of game-based learning as well as digital stories as effective digital technologies in education. They maintained that such software may help improve their engagement levels during formative assessments. However, there were mixed reactions from students with regards to coursework and in-class assessments involving the use of digital technologies. S2, S5, S10, S11, S12, S16, S27, S29 and S41 said that digital learning resources were motivating them. Others stated that they had mixed feelings about them. Nevertheless, many students admitted that they were seeing specific benefits and challenges. They also come up with valuable feedback for further improvements in their class room. S12 held; "I learned from the digital story task. It was positive experience for me when I composed a digital story together with my classmates". Another student (S20) reiterated, "This digital storytelling experience has provided me with the opportunity to reflect on my life experiences". Similarly, another student (S7) claimed that the digital story has helped her write her assignment. Similarly, S11 stated that, "I learned how to be critical and reflective. Now, I know how to evaluate high quality content".

There were different shades of opinion among students. S1, S3, S9, S13, S17, S19, S22, S24, S28, S35 and S38 held that the digital story assignment was difficult for them. S3 reported that she was a timid person. She went on to say that she did not like to divulge personal

information about herself. Evidently, the students were expected to open-up with their peers (during this digital task). They were expected to share their own experiences with others. S1, S3, S8, S22 and S35 also admitted that they did not want to show their personal emotions during this particular class activity. The researcher believed that these challenges were not necessarily negative, but may be considered as stretching on the personal boundaries. For instance, S11 claimed that, "This project did help me to step out of my comfort zone. It also allowed me to build a better relationship with my classmates". It transpired that these formative assessments have brought forward student concerns about sharing certain personal information with peers. Moreover, some other students (S2, S4, S7, S9, S11, S29, S36 and S40) also raised technical issues that were related to their digital assignment. For example, "This story has helped me enhance my digital skills as well as my proficiency in different programmes and applications" (S29).

One of the students (S14) declared that, "Indeed, this digital assignment was relevant for my future employment prospects. I will surely make use of the knowledge and skills that I have learnt today during this simulation game". S15 admitted that she was not a technophile, however the digital learning game was challenging. Evidently, the game has enticed her curiosity to complete the levels. She felt a sense of accomplishment and intellectual stimulation when she succeeded in finishing the game. In her own words, "I could not express my feelings; I am very happy that I managed to complete all the levels of this simulation game". In addition, the building of interpersonal skills through group work activities that involved digital resources were also considered as important elements of contemporary education. The students admitted that digital games have enabled them to actively engage with their peers during the simulation game. They were expected to share their knowledge and insights with their class mates. This formative activity has effectively resulted in a cohesive class where individuals were valuing each other's ideas.

5   Discussion and Conclusions

This research suggests that electronic resources, including digital games could lead to favourable learning outcomes for students. Generally, the students declared that they have enhanced their digital skills and competences in their schools (Camilleri and Camilleri, 2017a,b). In the main, the students admitted that ubiquitous technologies have helped them improve their learning journey, in many ways. This study has shed light on the students' active engagement with digital games. It has evaluated how electronic resources and other

innovations such as mobile technologies are affecting the quality of education. The literature review has indicated the pros and cons of utilising digital technologies in secondary education.

This study's interview sessions suggested that electronic technologies have helped students to develop their interpersonal and social skills as they were expected to present their digital story to their class mates. This is in line with relevant theoretical underpinnings, as other academics maintained that electronic games can bring positive effects on students (Graesser et al., 2009; Yee, 2006). In this study, the students themselves have appraised the use of digital games and stories. The results suggest that the utilisation of educational apps in-class during formative assessments and the use of blended learning in the schools' curricula have brought significant benefits to students, in terms of their critical thinking and problem-solving skills. This research reported that the digital stories have helped learners to make evaluative decisions under stressful situations. At the same time, the findings suggest that the students had to use their relational skills as they worked in tandem with their peers. Evidently, the digital resources have helped them to improve soft skills such as working effectively with others and collaborating in teams.

In addition, this paper has considered relevant theoretical underpinnings that revolve on the social and psychological impact of digital learning resources (Camilleri and Camilleri, 2017a; Bennett, Maton and Kervin, 2008;). Other studies have also indicated that certain mobile (and tablet) apps can trigger positive or negative effects on conative, cognitive, sensorimotor and social skills of children (Papastergiou, 2009). Arguably, in this case, the students' positive experiences with digital stories seemed to have had a powerful influence on the lives of pupils. Moreover, this study reported how educational games instilled scientific deduction in students as they learned to contemplate on ethical and / or moral decisions. The students admitted that they were mastering and applying new digital skills and information, as they thought laterally and strategically to solve problems. This paper suggests that students can acquire relevant skills and tasks that may be used in their future employment prospects. In a similar vein, relevant theoretical underpinnings reported that digital games are designed to support continuous professional development and training (Kapp, 2012; Bennett et al., 2008; Pivec, 2007).

In conclusion, the combination of traditional and digital learning resources may provide the right arena for the advancement of quality education. Therefore, educators ought to understand the costs and benefits of using ubiquitous technologies in a context where digital skills are increasingly integrated into our routine activities. Digital literacy is just as important as reading, writing and math skills. This contribution suggests that digital resources, including; games, stories and simulations could support educational programmes. Therefore, educators are encouraged to utilise digital media in their formative assessments. This study has clearly indicated that students can acquire relevant skills and competences from educational apps; that may be used in their personal life and in future employment prospects.

5.1 Research Limitations

Admittedly, the lack of uniformity and consistency on the terms and constructs that describe educational technologies, including; electronic learning (eLearning), mobile learning (mLearning); educational apps, digital game-based learning, serious games, digital learning resources, digitally-mediated learning have made it difficult to compare results across previous studies.

This research was conducted in St Clare's College, which consists of ten schools in the northern harbour district in Malta. Therefore, the students that took part in this study hailed from the upper and middle-class families. Therefore, this purposive sample is not amenable in drawing conclusions on a broader student population. Therefore, the findings of this study ought to be supported by further research in Malta and in other contexts. Other research may consider different sampling frames, research designs, methodologies and analyses which could produce different outcomes.

5.2 Future Research

Undoubtedly, this qualitative research has opened-up some avenues for further research. A thorough review on the subject reported that when digital games were used regularly within the curriculum programmes; they were considered less of a novelty for students and educators. Perhaps, future research can specifically investigate the motivational appeal of digital games in supporting educational outcomes. Moreover, there is scope in analysing the designs of electronic games and digital stories in terms of their complexities and sophistication levels to improve on extant learning resources. This issue could be carried out

by closely monitoring the student behaviours as they engage in blended learning. Other empirical findings may reveal that there may be diverse motivations in favour or against digital learning among different demographics. For example, the individual students' gender, age as well as their position in the social strata may affect their disposition to using digital games to learn academic or vocational subjects. A longitudinal study in this area of research could also investigate the benefits of digital learning resources in education and establish its effects in the long term.

6   Appendix A - Interview Guiding Questions

- How do you use digital resources, including games in your classroom?
- Do digital learning resources and games entice your motivation and curiosity in academic subjects?
- How often do you access and use digital games?
- Do you have any recommendations to educators, in this regard.
- Which digital games do you like most? Why?
- Should in-class assignments use digital games? Why?
- Do you think that the school is dedicating enough scarce resources in terms of relevant investments in infrastructure and continuous professional training for teachers to improve their digital skills?

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