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SUMMARY

DOCTORAL THESIS

AN EXPLORATORY STUDY REGARDING THE USE OF BLOGS IN A PROJECT MANAGEMENT APPROACH IN TEACHING AND LEARNING FOR THE CASE OF "STUDENTS AT RISK"

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Introduction

The goal of the doctoral thesis is to explore and study the use of blogs in a project management approach in teaching and learning for the case of "students at risk". The thesis has been structured in 5 chapters in order to conduct the research of blogs in education, the ways in which they can be studied and maximize benefits out of it. Each chapter follows a structure that differ from one another but most of chapters have introduction, research objectives, research methodology if any, chapter content and the description of the conducted research followed by results and conclusions.

Chapter 1 is about Contextual and Conceptual Background of the Research where the main objective of this chapter is synthesizing the main theoretical and applied approaches that allows the correct substantiation of the students at risk issue based on previous results with reference to the role and importance of ICT tools, blogs especially, in increasing students' motivation in teaching and learning. So, for achieving this objective, a thorough literature review is carried out and the problem of students at risk is stated right from the beginning together with the students' motivation, pointing out that ICT may be the tool needed to shift student's motivation from extrinsic back to intrinsic. So, blogs are educational tools that help students, especially students at risk, learn better. Students at risk are students who are in danger of not meeting educational goals such as graduating from high school or acquiring the skills needed to become contributing members of society. The studied research shows how feelings of autonomy, goal orientation and task value are all related to improve in motivation among students at risk and also students in general. Yet ICT are considered a big factor in making positive changes in educational and pedagogical outcomes. This will support students' acquirement of the knowledge and skills needed to succeed in the knowledge based 21st century society. The graduates of secondary school must have these skills for the digital literacy requirements (i.e. ICT skills, critical thinking skills, and ethical skills). Web 2.0 applications such as blogs will enable students to acquire their digital literacy. There are two main types of blogs in school environment: class blog and student blog, each has its own setting. Using class blog in the classroom can help improve students' learning using each student's preferred learning style, their engagement and their personal interest. Using student blog has many advantages such as it encourages self-reflection for the student and

critical thinking. When using student blog, the students' iterative writing will be enhanced as their abilities to express themselves, to get feedback, and this will enable scaffolding. Generally, teachers can motivate their students through their relationships either with students or through their selection of instructional methods. Their selection of assignments in class blog, their follow up, and their feedback for student's blogs lead to successful deployment of blogs in formal education.

This chapter addresses the importance of blogs in formal education. It clearly differentiates between class blog and student blog. It also addresses the conditions recommended for its best deployment for students at risk.

Chapter 2 is the Research Methodology where it presents the path through which the research is conducted by designing the methodology of the research approach based on different types of research techniques, hence, the chapter presents the path from the problem statement to the solutions obtained by describing how the research outcomes will be reached in line with meeting the proposed objectives. The type of research enables the researcher to build a base for exploring his ideas, choosing the adequate research design and identifying the variables of the analysis. Also, the results of research can help other researchers enabling to know if it's worth pursuing. The author of the thesis started from the idea that the introduction of blogs can be useful to reduce the dropout rate of the students, raising the level of their motivation to learn and further explores the introduction of the elements like Gamification, Google Analytics and Augmented Reality for the students at risk case. So, the chapter presented the process of the flow of the research from the problem statement to the research findings of the proposed solutions. So, the overall research strategies and framework presented demonstrate how the objectives are achievable and how will be transformed into results. Also, the chapter presents rather a plea for the use of blogs than a simple justification and it places them at the center of research following to prove its usefulness for solving the stated problem by integrating them in the proposed solutions: Blogs-based Approach for Integrating Analytics and Gamification in Teaching and Learning, Agile embedded in the Blogs Approach for Education, and Exploring the Possibilities to Integrate AR in Blogs

Chapter 3 is about a Blogs-based Approach for Integrating Analytics and Gamification in Teaching and Learning where the main objective of the chapter is Integrating Google Analytics and Gamification into blogs in teaching and learning. For achieving this objective, it is explored the link between the Web 2.0 technologies, Google Analytics and Gamification.

The research methodology is materialized in derived observations and patterns in order to formulate theories, and propose a new approach of the of Triple-Loop Learning application.

In this chapter the research will be focused on the use of Learning Analytics (LA) technological tools such as Google Analytics to integrate it along with Gamification elements in Blogs. The definition of Gamification is discussed along with its relationship to education. Two types of blogs used in education will be presented with discussion of Learning Analytics in general: Class Blogs and Students Blogs. Hence, Google Analytics will be discussed in particular and the advantages of introducing Gamification in educational blogs. Using Blogs is part of autonomous school settings which its aim is not only to individualize learning but to have students take responsibility for their own learning, reflect and evaluate their own learning. So, blogs are web 2.0 tools that have a great potential in education, the main two types of blogs are class blogs and students' blogs, both have different criteria and different application settings. Learning Analytics (LA) is a new tool to analyze learning and teaching to optimize successful learning, Google analytics (GA) is a technology aspect of (LA) that enable more information to be gathered about learner attitudes, learner habits and learner's response to such educational content. Gamification is the way of using games elements in non-gaming environment such as education. The integration of both GA (by using adequate metrics) and Gamification in class blogs and students' blogs will carry a new potential for successful learning since improving the motivation and engagement of learners in learning activities is important for the development of skills and competences. By using the proposed approach of Triple Loop Learning based on Plan-Do-Study-Act (PDSA) cycle the results showed how the blogging process moved students from a single-loop learning process to double-loop learning with reflection and increased motivation and engagement, but for enhancing the learning and reflection for the educator in order to contribute to the third loop, more preparation is needed to use specific methods and the intrinsic qualities of the teacher (teacher efficacy) in order to enhance the learning approach to demonstrate an increased student satisfaction which was measured by student evaluations and an elevation in self-reflection on content

specific knowledge which will eventually improve individual and classroom learning. Gamification is not effective by itself, but different game design elements may trigger different motivational outcomes. So, competence and autonomy regarding task meaningfulness will be affected by badges, leaderboards, and performance graph. Also, social relatedness may positively be influenced by using avatars, which is a meaningful story, and teammates. Using GA in the proposed approach will provide "measures" of and for the improvements dictated by the PDSA cycle for adapting the educational process to the needs of each student.

Chapter 4 is Agile embedded in the Blogs Approach for Education where the main objective of the chapter is identifying the proper project management methodology for implementing the approach that integrates Google Analytics and Gamification into blogs in teaching and learning where a successful education process delivers effective learning being designed in order to enhance it. In the context of the research, blogs proved to be useful educational tools with significant results especially when integrating elements of Google Analytics and Gamification.

The educational process will be presented as a result of the project management approach considering previous experiences regarding education projects and exploring the possibilities of adapting to the dynamics of the digital age. So, Agile methodologies in educational environment are considered, and Scrum methodology for the case of blogs - based approach in education integrating Google Analytics and Gamification is applied. Though, ICT is widely considered, among the scientific community, to have the ability to lead to significant educational and pedagogical outcomes along with support to students' development. Additionally, ICT can acquire students the knowledge and skills that they need to succeed in the 21st century society and after the Covid-19 Pandemic. Such skills needed for graduates of secondary school includes digital literacy requirements which contain ICT skills, critical thinking skills, and ethical skills. So, using Web 2.0 technologies which includes blogs, wikis, social bookmarking, social networking, RSS, media sharing, podcasting, etc., have enabled students to acquire many parts of the digital literacy requirements, hence, academics, researchers, educators and policymakers have encouraged the use of these emerged Web 2.0 applications and acknowledged the potential to offer for enhanced learning opportunities for students along with the support it has for lifelong competence development. So, based on

the blog application and implementation in the educational process, there are certain approaches meant to help improve education through the emerged agile approaches. The contribution of the author of the thesis is related to the applicability that was demonstrated by the results of the Scrum methodology application as well as of including Gamification tools and Google Analytics techniques for the blog project. The aim in this case was to help raise student interest and motivation and the proposed approach can be enhanced by integrating newly emerged Quality Management and Gamification tools which can further improve the educational process.

Chapter 5 is about exploring the possibilities to Integrate Augmented Reality (AR) in Blogs where the objective of the chapter is exploring Augmented Reality integration in Blogs in teaching and learning. The research contained in this chapter was done during the pandemic period in order to offer a solution for better communication in teaching context for students and continue on using blogs as ICT tool. So AR has the capability to facilitate technology's usage integrated in education field in a different way than before. There's evidence from scientific literature that AR has positive effects on learning. Combined with blogs, AR will have new frontiers to be explored. Two approaches are proposed here that introduce the strength of AR combined with Blogs in an educational framework: first AR usage, which is aroused by markers, in order to solve a problem and to upload the solution in a blog (the blog is used as an electronic portfolio). The second approach used is Engine-based Blog. Both approaches may benefit the power of AR in order to enhance learning, provide students with 21st century necessary skills and increase the level of motivation. The first approach is simple using the case of electronics course that uses Electric Circuit AR to solve electronics problems without using any hardware elements. The second approach used is more complex, where the issues presented are the principles of designing an AR engine for blogs using an example from electronics smart house system course. So, the AR applications are still in the infant stage mainly because the AR is a new technology that has not been exposed fully, yet the power that it is inside it can produce a promising effect to enhance many fields including teaching and learning. Once it’s implemented in learning in a suitable manner it will then increase motivation, and provide learners across the educational system with 21st century skills. One of the promising applications of AR in education is the implementation of AR with blogs especially when using a blog as an e-portfolio in order to record AR posts, this setting had

shown enhancement in learning, it promoted deep learning, it enabled students to self-reflect on their own posts and promoted for them self-regulated learning which is indeed a 21st century learning skill. Another approach to blend AR with blogs is Engine-based Blog which is a different approach that has a promising positive effect on students learning and their motivation. The courses proposed that support using AR can be carried out in the micro learning system and in the virtual elements that was presented which then can be used in the laboratory, as a practical part of the course, and in a relatively short time. It can also be applied in modules which can help achieve a learning objective or it can solve educational problems.

Conclusions

The research investigated the use of ICT tools in a project management approach in teaching and learning for the case of "students at risk". This was achieved by utilizing established educational theories and the work of other researchers which was obtained from a review of the relevant literature. Selected empirical studies which were conducted by other researchers in the field were reviewed. Case study research with adapted multi-instruments was used for the empirical study. An example of ICT tool used in social media is blogging which plays an increasing role in our life, being adopted for educational purposes for successful teaching and learning across two challenges: a STEM (Science, Technology, Engineering, Mathematics) subject and the case of students at risk. This study shows improvement in students' motivation and achievement with special conditions to be taken into consideration like teacher efficacy, and educational curriculum selection. The research also showed the importance of using ICT in education (the use of web 2.0 tools like blogs) and especially in STEM subjects that are usually hard for students and especially students at risk who tend to have low motivation, lower grades, and tendency to drop out of school system. Hence, comes the importance of exploring new approaches to motivate these students as the current COVID-19 epidemic pose new challenges in teaching and learning. Yet ICT tools like blogs become more important for such situations and, as the research showed, there are more scientific evidence to support and positively impact in such critical situations about how blogs give opportunities for multi model expression, scaffolding and feedback, along with reflective composing and revising activities. But not to forget the importance of assignment selection

and teacher efficacy in the deployment of blog-based instruction. The use of Gamification in instructional design had also a positive impact on learning, as students' engagement in a gamified learning activity resulted in a better learning outcome. The use of Gamification along with the use of Google Analytics (GA) accurately measured student's immersion in learning. So, the use of ICT tool like blogs had proved useful as a lever to raise students' motivation, academic learning in general and the self-regulated learning in particular which is considered important as a 21st century skill and during the COVID-19 pandemic period. The use of blogs was proved useful as student blogs to show their work or as teacher blog to present dynamic curriculum to students as it considered Asynchronous Learning versus Synchronous Learning. Once Project Based Learning (PBL) is introduced in the approach of ICT in teaching and learning there arises the need to manage these projects using an Agile methodology which, in our case, was Scrum. The results conform with scientific literature which asserts the advantage of using Agile methodology in managing educational projects and in this case in STEM subject where Agile provides students with workforce ready skills like collaboration, critical thinking and gives them better performance in group projects. Additionally, the introduction of new ICT technology like AR, as further enhancement of this research, could enable students to perform better and be more immersed in learning by improving their practical skills during laboratory activities. Yet, with the COVID-19 pandemic, in the early study performed, AR had enabled students to use teacher blogs to get their pedagogical knowledge and post their work on their own blogs to show their work with an increase in motivation. Students stated it clearly that AR tool was pleasant for them, it increased their satisfaction and engagement, by developing the students' perception about their competence to deal with hard-to-understand STEM curriculum concepts. Two simple-to-complex approaches were presented to integrate AR into blogs the first one was an interactive approach that give students tools to practice using AR which was making electronic circuits, while the second approach was tutorial oriented using AR as a mean to present knowledge where the approach was based on smart house system and using sensors and smart gadgets to represent various parts of the smart house, so both had used applications from STEM subjects. However, the educational materials provided (video, text and images) must though be well organized and relevant in order to enable students to utilize the advantages of bringing reality to a hard to comprehend scientific concepts and to reduce cognitive overloading.

Contributions

Theoretical contributions

1. Conducting a thorough literature review of students at risk which includes a view of the research field as it currently is, a broaden search area, exploration of related articles in depth, and following the citations of related articles.
2. Reviewing the concept of ICT tools in education, the definition of the concept, the importance of ICT in preparing students for 21st century skills which includes scientific statistics.
3. Analyzing the use of blogs in K-12 setting, including many definitions of blogs, types of blogs, the educational value of blogs, and up to date review of main blogs providers.
4. Highlighting the importance of teacher efficacy in motivating students. This includes the definition of the term, reviewing literature related to the connection between teacher efficacy and motivation of students.
5. Composing a lengthy review of Learning Analytics, its history and perspective, LA-Techniques and applications, the values of learning analytics, and its importance to education in general. The review also includes a revision of Google Analytics (GA), Integrating GA in blogs, the use of Gamification in blogs, and Characteristics of a Game.
6. Formulating new theories of integrating Analytics and Gamification in Teaching and Learning based on Blogs.
7. Examining the relationship between Agile Development and the educational process.
8. Devising a theory of integrating blogs with Augmented Reality (AR).

Methodological contributions

1. Designing the framework for Gamification (G) and Google Analytics (GA) using teacher and students Blogs. GA was used as a metric solution for two situations: first with Gamification and secondly without Gamification elements based on students' assessments and achievements and how Gamification improves the students' involvement and engagement supported with factual data.

2. Constructing an approach that integrates Triple-Loop Learning based on PDSA Cycle showing how blogging moves students from a single-loop learning process to double-loop learning which includes reflection, and enhances the learning and reflection for the teacher.
3. Producing a methodology in Agile for the blogs-based approach in education integrating analytics and gamification using Scrum embedded in student's blogs by organizing them mainly into small teams that execute the projects according to Scrum rules and regulations.
4. Devised a scheme to integrate Augmented Reality (AR) in teacher and students' blogs since both can be simple to deploy in any education setting through two simple to complex approaches, first using simple approach AR e-Portfolio by applying a marker, and secondly by using complex approach through examining AR Engine based Blog using virtual objects.

Practical contributions

1. Applying the proposed framework for evaluating the students' perceptions and outcomes in using the class's blog without G-elements and using the class's blog version with G-elements.
2. Scrum implementation for the Blogs-based Approach in Education, Integrating Analytics and Gamification.
3. AR Integration in Blogs in teaching and learning - AR based Blogs Approach.
4. AR based e-Portfolio, AR Engine Based Blog.

Limitations of the research

1. The research is based on data collected mostly during 2016-2019 and just before the spread of the Covid-19 pandemic.
2. Students during the research were Arab males, in East Jerusalem area yet ethnic variables may affect the range of response during data collection, but results may not differ entirely.
3. The design methodology is based on qualitative approach which is more suitable to address social issues and analyze human response, and human interactions.

4. The sample size range between one or two classes of students in K-12 education with numbers of students between 22-43 students depending on the subject.

Further Enhancements

1. As this research explored the use of ICT tools in a project management approach in teaching and learning for the case of “students at risk”, further study is needed to explore the effect of COVID-19 pandemic on the use of blogs within on-line learning setup along with or without using content management system. In fact, COVID-19 pandemic poses new challenges to teaching and learning in general and to education of STEM subjects in particular. These were addressed by the early study on AR embedding in blogs.
2. Both the use of blogs in Synchronous Learning versus Asynchronous Learning needs further study.
3. The interaction of students with small screens in their mobiles or on their screen monitors for multiple hours is raising questions on how to manage STEM educational projects using Agile methodology.
4. The use of Gamification has different variables during a lengthy on-line learning.

Additionally, new frontiers and new dimensions are opening wide through such pandemic that poses new challenges to teaching and learning through these tough times.