ICED 2020 proceedings: Artificial Intelligence enabled Smart Learning

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Abstract

Artificial Intelligence (AI) is a discipline of computer science that deals with machine intelligence. It is essential to bring AI into the context of learning because it helps in analysing the enormous amounts of data that is collected from individual students, teachers and academic staff. The major priorities of implementing AI in education are making innovative use of existing digital technologies for learning, and teaching practices that significantly improve traditional educational methods.

The main problem with traditional learning is that it cannot be suited to every student in class. Some students may grasp the concepts well, while some may have difficulties in understanding them and some may be more auditory or visual learners. The World Bank report on education has indicated that the learning gap created by this problem causes many students to drop out (*World Development Report*, 2018). Personalised learning has been able to solve this grave problem. Brainly is one example: an AI-based knowledge-sharing social network where students post and respond to questions asked by other students. This collaboration, along with personalisation-based machine learning algorithms for networking features, has made Brainly a successful platform with 8,000 items responded to every hour. AI is also used in the classroom: China's largest AI education platform “Squirrel AI”[3] has successfully implemented its system in many cities to provide personalised learning. They claim that their system was better at improving math test scores than experienced teachers teaching in a four-day experiment program conducted in October 2017 (Dickson, 2017). These are just a couple of examples of the use of AI inside the classroom to enhance learning activity. A few more, such as “Osmo”[4] and “Classcraft”[5], are integrated into K-12 programmes. It has also been predicted that personalised teaching methodologies using AI will reduce the cost of education, which is quite high even in developed countries. Master Learner is an AI-powered education platform from Shanghai, and they have claimed that "we can make our training fee as cheap as drinking a Coke every day for a year" (*China Turns to Artificial Intelligence to Boost Its Education System*, 2017).

1 Introduction

Smart Learning includes new educational contexts in which the focus is students’ use of the technology at their fingertips. This depends not only on the software and hardware available but on how they are used in the classes. The main problem with traditional learning is that it cannot be suited to every child. The World Bank report on education has indicated that the learning gap created by disparities in this regard causes many students to drop out of school. Personalised learning has been able to solve this grave problem. The theory and development

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of computer systems able to perform tasks which typically require human intelligence is known as Artificial Intelligence (AI), and AI comes into play here; see the examples below.

2 Classcraft

2.1 The system

Launched in 2015, Classcraft is an award-winning, teacher-friendly gamification tool that is now used in more than 50,000 classrooms in 75 countries in 11 languages. The Quebec- and New York City-based education technology company uses gaming principles to address student motivation. It utilises gaming principles to foster social-emotional development and personalised learning, enabling educators to adapt curricula and teaching style to an individual student's needs. Highly customisable, this revolutionary educational approach can be adapted to any subject and has been proven to be very effective at improving student motivation, increasing student engagement and creating a positive classroom community by fostering secure team building.

2.2 Facts

1. Nearly 54% of the EU population plays video games, which means that there are some 250 million players in the EU. Roughly half of players are female (46%), and 54% are male (Games in Society, 2019).
2. 58% of parents play video games with their kids to socialise with them (Hallifax et al., 2019).
3. A study funded by the British Academy and published in the journal Computers in Human Behaviour, found that 13-to-14-year-old girls classed as “massive gamers” – those playing over nine hours a week – were three times more likely to pursue a PSTEM (physical science, technology, engineering, and math) degree compared to girls who were non-gamers ("Geek Girl" Gamers Are More Likely to Study Science and Technology Degrees | University of Surrey, 2019).
4. A study by Centre de Liaison sure Intervention et la Prévention Psychosociales, or (CLIPP) showed that gamification could help prevent bullying (Classcraft - Gamification in Education, 2019).

3 Alta

3.1 The system

Alta is a software product built on a personalised learning engine for students pursuing higher education by Knewton, a New-York-based adaptive learning company. Knewton released Alta in January 2018 after ten years of experience with publishers. It is powered by their in-house high-quality content curated with long experience in the industry. The software is available to students as a standalone package and to universities and institutes as a comprehensive tool for all students. The product covers courses in mathematics, chemistry, economics and statistics. Courses contain textual, graphical and video-based content. The software is available for students as a standalone version for just $39.95. Alta's mobile app has made it a mobile software for every student to use on the go. The best thing about Alta is that students are not just left alone with the software; there is 24/7 online chat support for student doubts and queries.

3.2 Facts

1. 87% of the time, students using Alta completed their assignments with proficiency.
2. Of students who struggled in their assignments, 82% of them completed them.

3. Students who used Alta and did not complete an assignment scored 55%, while those who completed their task scored an average of 81%.
4. Students who were struggling have shown improvement in their scores, from being at 40% to achieving 78%.
5. 85% of students feel that Alta is improving their skills.
6. Arizona State University has claimed that after implementing Knewton's adaptive learning technology, on which Alta is based, there has been a decrease in dropout rates from 13% to 6% and a rise in pass rates from 66% to 75%.

4 Squirrel AI learning

4.1 The system

Squirrel AI is a Shanghai-based after-school tutoring company with nearly 2000 physical classrooms in China. Squirrel AI was founded in 2014 by Derek Li Haoyang after he stepped down as CEO from his previous education company, which featured an IPO. Using a laptop computer with the company's software installed on it, students study their lessons in a classroom supervised by a teacher of the respective subject.

Squirrel AI's main motive was to address the problems faced in the education system: lack of personalised attention in classrooms and unequal distribution of educational opportunities. The inefficient, rigid education system has decreased students' enthusiasm for learning; this motivated Derek Li to build what is China's most extensive AI-powered education product. Squirrel AI's scope and reach are impressive. However, the concept behind adaptive learning systems like Squirrel AI and others will not make teaching professionals obsolete any time soon. Instead, Squirrel AI is designed to support and augment the work of teachers by taking away the need to teach the "nuts and bolts" of each course (*Building Personalized Education With AI Adaptive Learning - AI Business*, 2019).

4.2 Facts

1. It has been shown that the Squirrel AI system can teach 48 knowledge points in eight hours on average, whereas a human teacher can explain 28 knowledge points in the same period.

5 Conclusions

In summary, Artificial Intelligence enabled Smart Learning is the next logical phase in the introduction of technology to classrooms and educational centres. The global educational landscape has been changing with the introduction to new state-of-the-art intelligent environments; a few have termed this "climate change" in education. Our paper (originally a poster) presents some of the latest successful software and its implementation, all based on AI enabled Smart Learning. However, this is not just about selecting a tool or technology – even though technology (like it or not) is essential to learning and is a primary part of every industry and because it changes so quickly students are better off learning about it sooner. More than this, it is essential to deploy a proven methodology that works with students and develops their skills in a progressive, natural and effective way.

We thus bear in mind that the technological and pedagogical advancements described above are not meant to supersede current teaching and learning education systems, but rather to provide a holistic spectrum of complementary supporting tools which harness and exploit this emerging paradigm to its full potential for smarter education (Smart Learning for the Next Generation Education Environment, 2014).

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Evaluating the use of a collaborative content curation tool to support online assessments

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Abstract

The University of the South Pacific (USP) is one of three regional education institutions in the world. The History Department which is based in Fiji represents one of the few disciplines at USP which delivers its undergraduate programme fully online. Together with the Centre for Flexible Learning (CFL), the History staff have been evaluating the effectiveness of online teaching and experimenting with technologies and tools to overcome teaching and learning challenges. This paper discusses an experimental mobile app which was created by third year History students at USP in 2018 to document local historical sites in the Suva area. It considers the challenges and opportunities created by online learning in the uniquely regional environment of the South Pacific. It further explores how technology can enable more practical and relevant applications and assssments of History content curation to better prepare students for future careers.

1 Introduction

The History Department in the School of Social Sciences is in a unique position as one of the few disciplines at the University of the South Pacific (USP) to offer a full undergraduate programme online. Together with the Centre for Flexible Learning (CFL), the History staff have been evaluating the effectiveness of online teaching and experimenting with technologies to overcome teaching and learning challenges. Student and stakeholder feedback highlighted the need for more practical and relevant applications of History content curation and assessments. Limited research on local histories in Fiji has been produced to date (Derrick 1950; Lal 1992) and the teaching of History in Fiji is limited by a lack of up-to-date open educational resources (OERs). Locally relevant historical information would benefit the community by providing educational resources for local schools, encouraging history tourism for foreign visitors (particularly those from the regular cruise ships), and generating interest and enthusiasm amongst the local community.

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One of the key emerging issues in higher education is how to foster interactive and authentic learning in an online environment. This is particularly challenging for Pacific Island countries which are characterised by significant diversity and often lack access to specific contextualised resources. As the capacity and utilisation of the Internet evolves phenomenally over time, eLearning strategies also need to keep pace. How can we use new technologies to improve student learning experiences, while at the same time cater both culturally and technologically to a diverse student population?

One of the challenges that students in online courses face is navigating and discerning information on the World Wide Web. This has been expressed by some as an "information overload" problem, but perhaps this explanation is too simplistic. As Seitzinger (2014, 412) notes, connected individuals are not experiencing an information overload problem, "but rather a filter failure, our lack of having a process for operating in this new environment." Search engines have become increasingly sophisticated and institutions (like USP) have been training students on how to effectively use these tools. However, it is unclear if this training is sufficiently addressing the issue. The solution may lie in a more collaborative approach to technology. It should not be the sole responsibility of the teacher to filter content for students; rather, students need to be actively engaged in the process of filtering content for themselves. Content curation is one way that this goal could be achieved, and evidence suggests that content curation could improve student learning as well as help to create contextualised resources for Pacific Island countries in the future.

Content curation is the process of aggregating, validating, and annotating existing content with its associated intellectual property claims into a comprehensive repository (Rotman et al 2012, 1093). It is essentially a process of strategic collection and presentation. One of the main advantages of curating digital content is that different mediums can be utilised to present information, such as blogs, podcasts, videos, webinars, social media posts and infographics. Curating of content is a useful tool because it gives students the opportunity to edit and filter information according to their own learning abilities and interests and it allows curators to control the quality of information presented about a topic. Content curation can be done manually by individuals, or with the aid of automated software. Social media platforms such as Pinterest, Flickr and other free to use software such as Scoop.it, Learnist, Pearltrees, Storify, Delicious, or BagTheWeb can help collect and share curated content. Numerous studies have highlighted the benefits of content curation for student learning and engagement (Deschaine and Sharma 2015; Flintoff, Mellow and Clark 2014; Zhong et al. 2013; Lambert and Frisch 2013; Minocha and Petre 2012). However, the changing nature of technology has meant that many studies of content curation quickly become obsolete or outdated.

2 Research questions

The purpose of this project was to evaluate the use of a collaborative content curation tool to support online assessments. The outcome was the development of an OER mobile history app which collated, curated and communicated local knowledge about key historical sites in Fiji[3].

1. What is the impact of the collaborative content curation tool on student learning and engagement in an online environment?

2. How can these technologies effectively facilitate collaborative eLearning to enhance student learning?

3. What alternative strategies or technologies can be employed to make History teaching online more interactive and contextualised?

[3] The Fijian History app can be freely download from the Google Play Store and Apple App Store. A website was also created (https://fijianhistory.com) to accommodate users without access to mobile devices.

3 Methodology

The development of the mobile app was embedded within a 300-level online History course in Semester 2, 2018 (titled HY304 Pacific History: Protest and Identity). 48 students (33 female, 15 male) participated in the research as part of their coursework assessments. Students were required to work in groups of five to compile historical data (primarily about locations within the Suva city limits) and populate the mobile app as part of a content curation assessment task. This data was presented in the form of written information (containing research about the history of each site), images (both historical and current), and audio (students wrote scripts and pre-recorded audio to be used in the mobile app). Students were asked to design, test and revise the mobile app before it was launched to the public on 19 October 2018. The research team utilised quantitative and qualitative analysis of data from four sources: Moodle Analytics; Google Analytics; feedback surveys (quantitative and qualitative); and individual qualitative interviews with ten students.

4 Results & discussion

4.1 Student feedback survey results

43 students completed an entry and an exit survey during the course. The average age of the cohort was 25, and 58% identified themselves as Fijian. The entry survey showed that the majority of the participants (77%) were competent with smartphone, tablet and/or computer technology. Being third-year students, most were confident in writing essays and using the learning management system (Moodle). Though most stated that they enjoyed reading (which is a major skill required in History courses), the course results suggest that reading skills were poor. Surprisingly, the majority of students (58%) preferred face-to-face courses over online or blended modes.

The majority of students (93%) enjoyed the project, most frequently citing the opportunity for practical fieldwork as one of the reasons. Though students did not specifically identify the app, they frequently referred to the benefit of interactions, which could be considered a consequence of the app project design. 85% agreed that the project was more relevant than other assessments. In qualitative interviews, some students explained the importance of research skills and local content for their aspiring roles as high school teachers.

Most (73%) preferred this project to an essay assignment because it was more relevant and engaging. They agreed that the design of the project was appropriate for an online course because it made learning easier, more flexible and more exciting. This confirms the value of the mobile app project for enhancing student learning. Interestingly, during interviews students noted that in addition to the mobile app, the use of Moodle, social media and face-to-face meetings was necessary for the project. This suggests that a single mode or use of technology is restrictive and ineffective in online learning. Rather, a combination of technologies should be made available to facilitate learning.

4.2 Moodle Analytics

The Moodle e-Learning platform was also used to analyse student participation and engagement in the online course. 81% of students registered on the HY304 Moodle page clicked on less than 50% of the course. This was a surprising statistic, considering that 48% of students in the first-year online History course clicked on less than 50% of the course. This suggest that as students gain confidence and familiarity with online History courses at USP, they learn to prioritise only the content which is assessable. It also signals that course coordinators and designers need to be more creative in finding ways to encourage student engagement in online learning.

The absence of plagiarism was a positive and unexpected side-effect of this project design. The content for the mobile app by groups was submitted via a text matching software (Turnitin) which guides teachers in determining plagiarised content. In this case, no plagiarism cases were detected. Students were discouraged from plagiarism because the content of research was not easily accessible online, and students were aware that their work would be published publicly. This is an improvement compared to previous course offerings, where students frequently exceeded 20% Turnitin similarity scores.

4.3 Google Analytics

Google Analytics has also been useful for determining initial engagement with the Android version of the app. As of July 2020, 9894 users have accessed the content. Of those users, 47.4% have accessed the content from their desktops and 52.6% have accessed it from a mobile or tablet. The two largest proportions of users are aged 25–34 (33.5%) and 18–24 (27.5%).

The most interesting data collected is the popularity of particular pages. The Momi Bay Historical Park is rated as the most popular site (8%), followed by pages which focus on indigenous Fijian sites (Origins of Suva, Tavuni Hill Fort, Great Council of Chiefs) (all approximately 5%). The popularity of the World War Two Gun Battery at Momi Bay, may be attributed to tourism, as it is a key tourist attraction for international visitors to Nadi. The popularity of indigenous locations on the mobile app may be due to the fact that users are unable to find information about these places elsewhere online. There remains greater scope for promoting this mobile app to visiting tourists, particularly those on cruise ships that dock at Suva Harbour. Offering guided walking tours in association with the app may be a useful addition to stimulate engagement and use. Much more can be done to expand the app beyond the confines of Suva, and to document in greater detail indigenous historic sites, such as villages and natural features. For the time being, each year a new class of History students is tasked with documenting new sites to add to the app.

5 Conclusions

Below are some tentative conclusions based on the study:

1. Mobile apps can demonstrate the applicability of theoretical knowledge to students, as well as the limits of technology as an intellectual tool.
2. Though the mobile app enhanced student learning by encouraging greater interaction, it should not be used in isolation, but rather in combination with institutional learning management systems (Moodle), social media and face-to-face discussions.
3. Public presentation of assignments can discourage plagiarism and increase student motivation.

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