Measuring Students' Competencies With ShareLook as a Digital Portfolio

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Abstract. The growing need for STEAM Education is a key indicating emphasis of the importance of competencies and skills. This new paradigm shift is playing a crucial role for jobseekers in a world soon to be dominated by polarization. One of the main objectives of Tsing Hua STEAM School is to explore the feasibility of measuring learners' competencies in STEAM Education with the use of a digital portfolio, to ensure the employability of graduating students in Taiwan. For this paper, we will be partnering with ShareLook to explore how critical thinking is being developed in the learners.

Keywords: STEAM Education, Tsing Hua STEAM School, Critical Thinking, ShareLook

1   Introduction

The composition of jobs and skills demanded by employers have changed dramatically due to technological advancements [1]; whereby mid-skill jobs disappear because of increased mechanization and digitization of routine tasks. This phenomenon is termed job polarization [2]. To ensure workers stay employed in the new industry, America is advocating STEM Education strongly [3]. To combat the same challenges in Taiwan, the revised Curriculum Guidelines of the 12-Year Basic Education [4] placed a greater emphasis on achievement of competencies. Tsing Hua STEAM School [5] was started in 2018 with an intention to help teachers leverage on DDMT Model [6] in relooking lessons design. The biggest differentiator is that competencies are 'soft skills' and should not be measured using the traditional 'pen & paper' test. Many academics and research in recent times have pointed to the use of a digital portfolio [7] in tracking the progress of the learners as they display competencies such as critical thinking, communication and problem-solving. The aim of this paper was to suggest how the Technology Acceptance Model increases user motivation of a digital portfolio; and how ShareLook can seek to capture the communication and critical thinking process of the learners.

2   Related Work

2.1   Technology Acceptance Model

The growing technology needs brought about by Industry 4.0 has resulted in many providers jumping on the bandwagons to provide new systems for adoption, this has also accounted for increasing failures of system adoptions in organizations; thus predicting system usage is paramount for system adoption to happen [8]. For this study, I will be using Technology Acceptance Model (TAM) to predict user motivation of ShareLook.

Technology Acceptance Model was first proposed by Davis in 1985; where system use is a response that can be explained or predicted by user motivation which is influenced by external stimulus consisting of the system's features and capabilities [9]. In his model, users' motivation can be explained by three factors: Perceived Ease of Use, Perceived Usefulness and Attitude Toward Using the system. According to Davis [10], the definitions for Perceived Ease of Use and Perceived Usefulness are:

> "Perceived usefulness: the degree to which an individual believes that using a particular system would enhance his or her job performance.
> Perceived ease of use: The degree to which an individual believes that using a particular system would be free of physical and mental effort."

Davis et al. further suggested in 1989 that 'attitude towards using the system' be revised to 'behavioral intention' as individuals will use the system without forming any attitude if system is useful. Venkatesh [11] identified two main groups of antecedents for perceived ease of use in 2000: anchors and adjustments. Please find below a graphical representation of extending TAM to include determinants for perceived ease of use in Fig. 1.
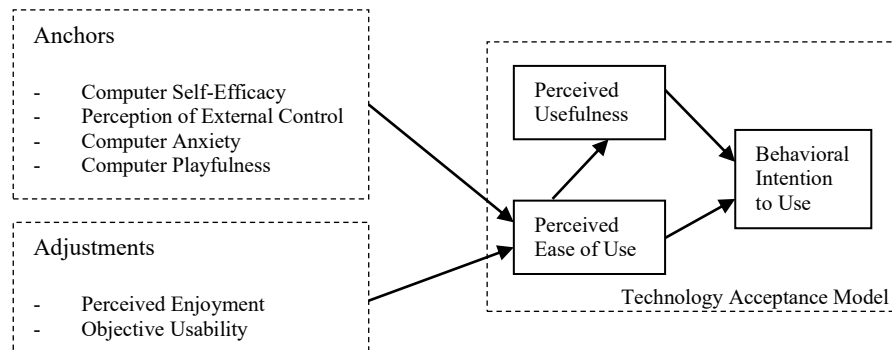
Fig 1 Extending TAM to include determinants for perceived ease of use

2.2 ShareLook

ShareLook is a pioneer in multimedia-based E-learning and mobile learning founded by Raanan Nedivi. Previously enrolled as a doctoral student in Biochemistry, he envisioned a growing demand for demand for multimedia-based education due to the onset of technology and made a switch to producing online interactive training videos industry and academic institutions. Headquartered in Singapore, Raanan has assembled a team of learning designers and programmers from Kenya, Thailand, and Nepal with a global vision of refining and preparing ShareLook for international usage. ShareLook as a platform checks many of the boxes by Venkatesh's extended model of Extending TAM (Figure)to include determinants for perceived ease of use. For example, ShareLook has integrated live webinars and text-to-speech features under its 'Live Events'. In addition, a transcript can be generated 30 minutes after the event has concluded, making it easy to replicate and translate to another language with ease. To encourage 'Anytime, Anywhere Learning' [12], concluded webinars can then be found in the Marketplace for learners to access at their own convenience.

A second feature is ShareLook's ability to connect learners internationally. As an online system that has undergone rigorous penetration testing, grouping international students is enticing for educators eager to develop students' competencies in a safe environment. Finally educators with a low level of self-efficacy in computers will feel confident to create content and assessments upon internalization of the DDMT Model [5], which is contributing factor of 'Perceived Usefulness'. The next stage of development is to integrate Artificial Intelligence into the digital portfolio segment; where students will be guided to address other areas of competencies based on rubrics developed by educators.

3 Participants and Settings

AnXing Elementary School in Hsinchu County was established on 1st August 2016 and officially began to enroll 1st grade students the same year. Every year, one grade level is added to the enrolment of the school. By 2020, it has enrolled approximately 1500 students, distributed within 52 classes from Grades 1-5. Through the joint efforts of the teachers, students, and Parents Support Group (PSG), the school's vision of 21st century global literacy has finally been integrated into the school curriculum. In addition to teaching the 12 Year Basic Education curriculum set by the state, teachers have an added responsibility of developing a customized curriculum for Chinese Art and Science subjects. We believe that the 21st Century is an era of increased collaboration between citizens from countries around the world. To achieve this heighten level of collaboration, apart from a strong literary foundation provided by our 12 Year Basic Education, providing our students with additional depth in language and science can enable them to have higher and further aspirations. The cultivation of art and literature can also enable students to develop values such as respect, inclusiveness and appreciation for global perspectives.

A total of 28 students will be participating in this research study. Their ages span between 9 and 11, or Grade 3 to 5 students. A big driving force for these students are the influences of their parents. Majority of the parents are involved in occupations at the nearby Science Park, a place similar to Silicon Valley for technology services. Another driving factor from working in the Science Park is the emphasis on globalization and skills necessary in Industry 4.0.

For this research, 28 students will be further grouped into 4 groups, each group led by a different instructor as they are guided to provide a solution for a problem around their lives based on the DDMT Model; Design, Discover, Model & Modelling and transfer. This study takes place over 30 hours (3 hours per session) as the students document their weekly progress using ShareLook.

4 Results

The following problem statements are crafted by the elementary students based on the DDMT Model [5]. They are:
- Building a safe and healthy schoolbag for elementary students
- Protecting the beauty of flora
- Creating a smoke-free environment
- Eradicating killer litter

Each problem statement is crafted by the students within the group as a problem that is critical to the students. As each group of 7 students are led through the four phases of 'Discover', 'Define', 'Model & Modelling' and 'Transfer', their learning progression were captured using ShareLook which the trainers had to create a course matching an assignment to each phase prior to the activities. For this study, a total of 4 assignments was created, one for each phase. Please refer to Fig. 2 and 3, depicting how courses can be created on ShareLook.
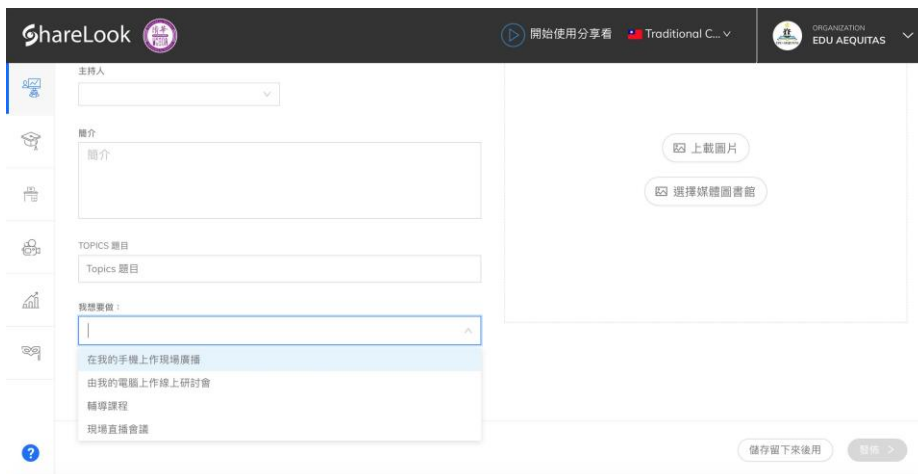
Fig 2 Creating a course in ShareLook
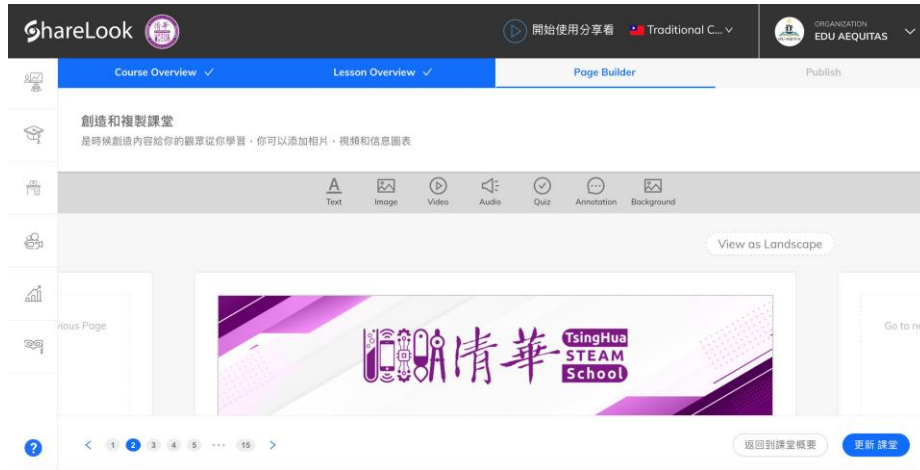
Fig. 3 A created course on ShareLook

A powerful feature highlighted by the trainers in the creation process is the ability to toggle between languages. This highly aligns to an important objective listed in the 12 Year Basic Education [4] of grooming a global citizen. It also falls nicely under the 'Perceived Usefulness' column of the TAM model, thereby enhancing the motivation for users. On the other hand, because the system is structured clearly with instructions, students can upload their work easily and timely through their mobile devices, allowing a more accurate reflection of their thinking and competencies at selected intervals. This is in line to the idea of a digital portfolio for measuring competencies [7].

5   Further Considerations

Although the research has proven adequate the use of a digital portfolio to document critical thinking, improvements could be applied to further strengthen the study. Firstly, I would like to insert one more assignment into each phase of the DDMT Model to have a pre and post comparison between each phase. This would imply that the trainer needs to re-define the learning outcomes for each phase very clearly in order to draw out the desired outcomes. Secondly, I would want to take the proposed and completed solution for trial in another area to demonstrate the understanding of the 'Transfer' phase. It would also be good for the system to capture any modifications made to their solutions in the new environment.

6 Conclusions

The use of a digital portfolio serves as a powerful indicator of following the learners' thoughts through the learning process. In this study, through the capturing of assignments at different junctions, the digital portfolio captures the multiple perspectives provided by the students in their attempt to solve their problem statement. Learning to solve a problem in different perspectives is a good indicator of critical thinking abilities [13]. It is also important to note that while TAM has shown evidence to increase trainers and students' motivation to use ShareLook, the organization, 'Tsing Hua STEAM School' does play a part in selecting ShareLook as the platform. The real success of this study would be evident if educators from AnXing Elementary School adopt ShareLook in the long run.

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