E-Learning Journey in Ngee Ann Polytechnic Library – Our Experience: A Review on Its Effectiveness and Future Directions

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Abstract
Ngee Ann Polytechnic Library has been creating online courseware to support its Library Orientation programme since 2013. Each development is a journey and not a destination. This paper covers the results of a 2013 study by the first author to evaluate the effectiveness of an e-Learning courseware, the inclusion of digital literacy content, tools used in the development, learning points and measurements of the e-Learning. Along the journey, the team improved on the content, delivery and aligned the e-Learning to the strategic directions of the polytechnic.

Keywords:
library orientation, e-learning, digital literacy, online courseware

Introduction: Background & E-Learning journey for Library Orientation

The Library Orientation programme in Ngee Ann Polytechnic is delivered through an e-Learning courseware, which is rolled out to Year 1 students. The programme is aimed at providing students with an understanding of the Library's facilities, resources, and services and basic information literacy skills. The phases of development for the Library's e-Learning programme on Library Orientation are shown in Diagram 1:

Diagram 1: e-Learning journey for Ngee Ann Polytechnic Library
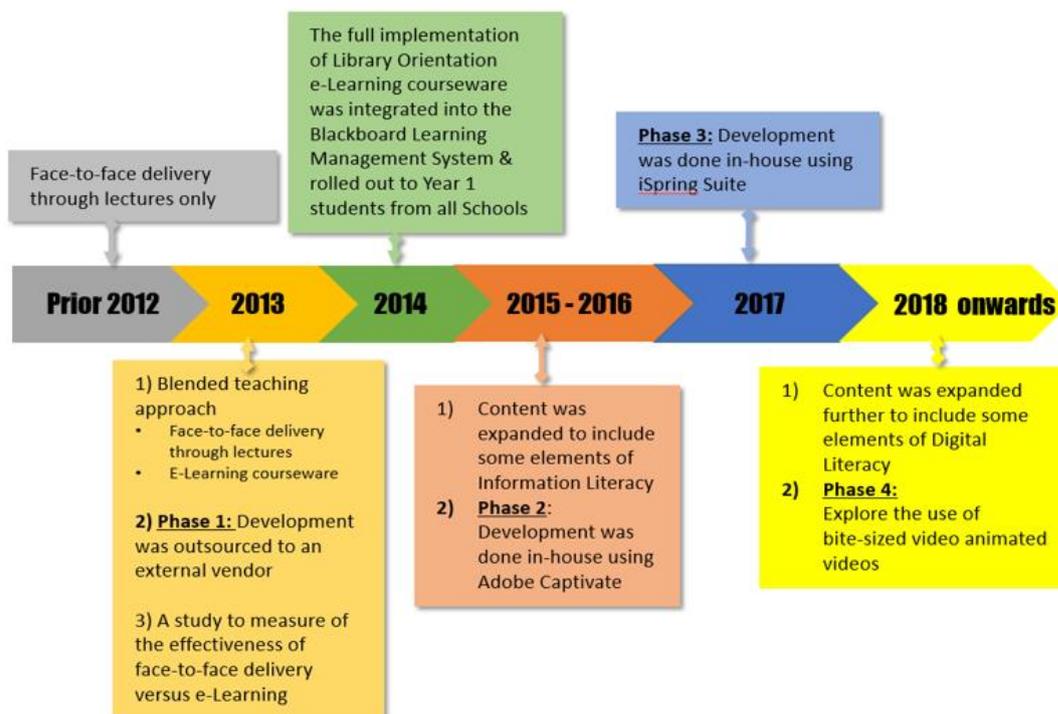
Phase 1 (2013): The beginnings of e-Learning journey

The Library adopted a blended learning approach for the Library Orientation in 2013. The modes of delivery were face-to-face delivery via lectures or an e-Learning courseware which was integrated into specific modules on the Blackboard Learning Management System. The former approach was labour intensive as librarians needed to deliver the lectures to all schools. Information shared in these sessions tends to be forgotten quickly. This led the librarians to repackage the content into an e-Learning courseware. The instructional design of the initial courseware was conceptualised by the librarians as shown in Diagram 2. The development was outsourced to an external vendor who used Adobe Captivate, an e-Learning authoring tool.

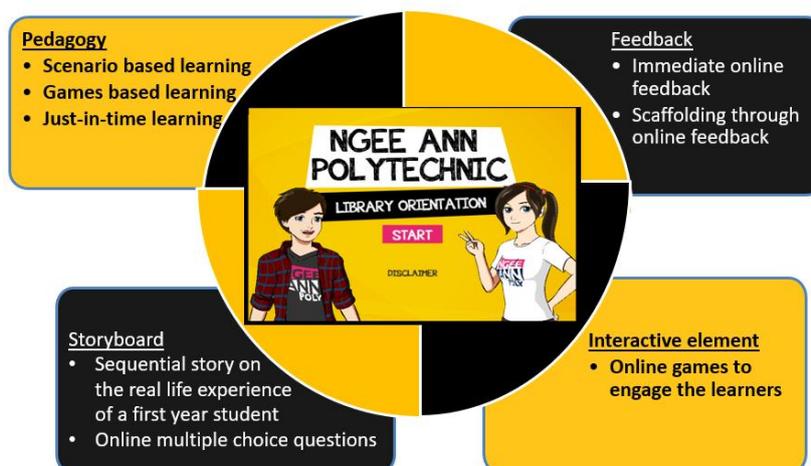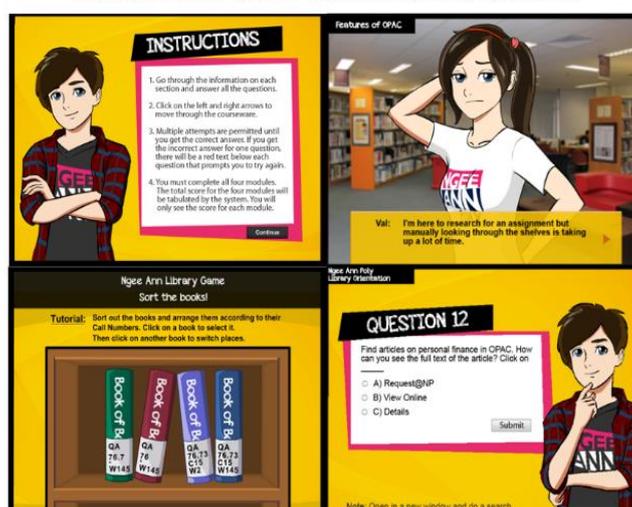Diagram 2 : Instructional design of the e-Learning courseware in Phase 1

Diagram 3: Storyboard of e-Learning courseware in Phase 1

The storyboard for Phase 1 of the e-Learning journey covers a sequential story between two characters conversing to find their way around the Library. In each scenario, users were shown images of the facilities, resources and services to help them navigate their way around the library. At different intervals in the e-Learning, users were prompted with quiz questions and online games. The e-Learning was developed as a sharable content object reference (SCORM) compliant courseware. The quiz answers were auto-tabulated in Blackboard Learning Management System's Gradebook.

Study on the effectiveness of e-Learning courseware
Parallel to the development of the e-Learning courseware, a study was completed by the first author for her Masters in Education in The University of Adelaide. The research aimed at measuring the effectiveness of e-Learning for Ngee Ann Polytechnic's Library Orientation programme from 2013 to 2014. The trends in her literature study showed that the mode of delivery for library instructional programmes leaned towards online. This was reflected in overseas and local libraries such as Concordia University, Canada (Wade, Locke & Devey, 2012), La Trobe University in Australia (Oke, Salisbury & Yucel, 2012), University of Iowa (Gall, 2014) and National Library Board, Singapore (Gee, 2012).

Measures of the effectiveness of Library Orientation programmes were reviewed in the study. Among them was the use of students' evaluation to gather their perceived feedback after the delivery of a session. This feedback was used to improve the delivery of Information Literacy courses in Wayne State University (Befus & Bryne, 2011) and Zayed University in the United Arab Emirates (Martin, Birks, & Hunt, 2010).

Another was the use of Customer Satisfaction survey to gather students' perception and expectations of the services. The perception on students' learning experience was found to impact their overall satisfaction level. This type of measurement could be used as an indicator to measure the success of students' learning (Parkhurst et al., 2008), quality of their learning experience (Piccoli, Ahmad & Ives, 2001) and how well students have learnt in a course (McFarland & Hamilton, 2005).

The use of test scores was also used to measure the students' competencies. For instance, performance-based tests were used to compare online versus face-to-face delivery in an Open University in U.K. (Richardson, 2012) and James Madison University Library (Blevens, 2012).

Since there is no consensus on the effectiveness of face-to-face delivery versus online delivery, librarians are constantly faced with challenging questions such as, "What is the most effective method of delivery for Information Literacy or Library Orientation programmes?", "How could the Library ensure that there is an effective use of resources through its Library Orientation programmes?" and "What are the indicators to measure the effectiveness of Library Orientation programmes?". The first author's 2013 study stemmed from these questions.

While much has been published on measures of Library orientation programmes, the literature lacked comparative analysis done between different modes of delivery. This has led the first author (Lim, 2013) to conduct a comparative study on two sample groups of first year students who went through the Library Orientation either through an e-Learning courseware and a lecture. The study had three objectives as follows:

1. To assess whether an e-Learning courseware is more effective to achieve learning outcomes.
2. To identify the significant factors that could be used to predict the success of an e-Learning courseware.
3. To identify the implications of this study to stakeholders and propose recommendations to improve the instructional design of the e-Learning courseware.

Research Design and Methodology
A quasi-experimental research design approach was conducted to two sample groups of first year students which were selected by convenient sampling (272 students per group) to compare the differences between an e-Learning courseware and a lecture as shown in Diagram 4.

Diagram 4: Differences in 2 modes of delivery
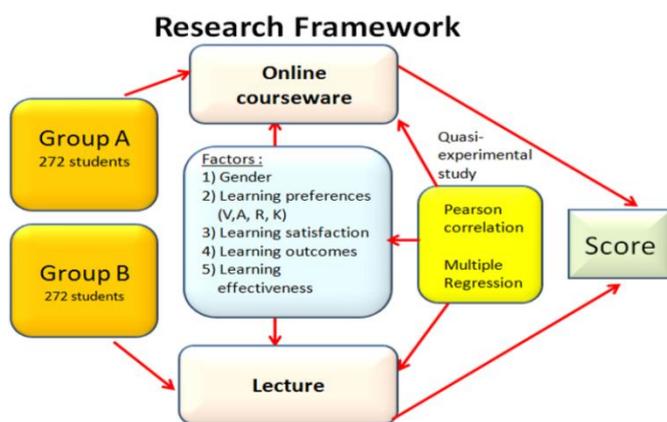
Group A went through a lecture approach of Library Orientation and Group B went through an e-learning courseware. Both groups took the same assessment and survey questions, one group in hard copy and another online. The survey questions were disseminated via a Customer Satisfaction Survey and VARK (Visual, Auditory, Read/Write, and Kinaesthetic) Learning Preference Survey (VARK Learn Limited, 2018).

Data collection and instruments
The assessment questions were automatically marked and tabulated using the Gradebook feature in Blackboard Learning Management System for the e-Learning courseware. On the other hand, the assessment questions were marked and tabulated manually by the librarians.

The study used an online survey tool to capture the responses for the Customer Satisfaction Survey and VARK Learning Preference Survey. The data collected for the study were reviewed and approved by the Institutional Review Board (IRB) of Ngee Ann Polytechnic. Data were used strictly for the purpose of the study.

Research Analysis
An analysis of variables such as gender, mode of delivery, learning preference, learning satisfaction, learning outcomes and learning effectiveness were done using comparative analysis, correlation design and multiple regression analysis to examine the factors that influence the effectiveness of Library Orientation programme. The data were analysed using SPSS Version 17.0 (Statistical Package for Social Sciences). The study used descriptive statistics, inferential statistics and independent T-test to measure the significant relationships between dependent and independent variables.

Results & Implications
Findings of the study are in Table 1 (Lim, 2013). These were used for consideration to improve the e-Learning courseware on Library Orientation in Phases 2 to 4 of the development.

Table 1: Findings, Implications and considerations for e-Learning design

Findings in the study	Implications for e-Learning instructional design	Considerations for improvement e-Learning courseware in Phases 2 to 4
Mode of delivery was the most significant factor that influenced scores	Provides inferences that delivery via e-Learning courseware may achieve better learning outcomes	Library will continue with the e-Learning approach of delivering library orientation using various platforms.
Students' scores in the assessment were higher for an e-Learning courseware as compared to lecture		
The overall perceived satisfaction was higher for an e-Learning courseware as compared to a lecture		
The students' intended learning outcomes were influenced by their satisfaction	When learning outcomes are articulated clearly, users are more satisfied with their e-Learning experience	The e-Learning courseware will highlight the learning outcomes more clearly
Learning preference was not a significant predictor for scores but it influenced scores through the mode of delivery	Librarians will consider infusing multi-format learning materials in the instructional design to cater to different learning preferences, which influence the scores	Interactive elements such as animation, videos, online games etc. and presentation of content will be reviewed and enhanced
There was no significant statistical relationship between gender, learning preferences, customer satisfaction and scores	Gender of users will not be considered in the instructional design	Nil

**Phase 2 (2015 to 2016): The mid-point of e-Learning journey**

Diagram 5: Library Orientation courseware (2015 to 2016)

Phase 1 had provided some insights for further improvement in Phase 2. The team explored the use of alternative platforms to develop the e-Learning internally instead of outsourcing to external vendors. The team attended training in Adobe Captivate and was able to acquire skill sets to do the development. The content update of the e-Learning package in Phase 2 was completed in-house using Adobe Captivate version 7 as shown in Diagram 5. Videos were created using this software to enhance the e-Learning courseware.

Phase 3 (2017): Development using iSpring Suite e-Learning authoring software

*Diagram 6: Library Orientation Courseware (2017)*
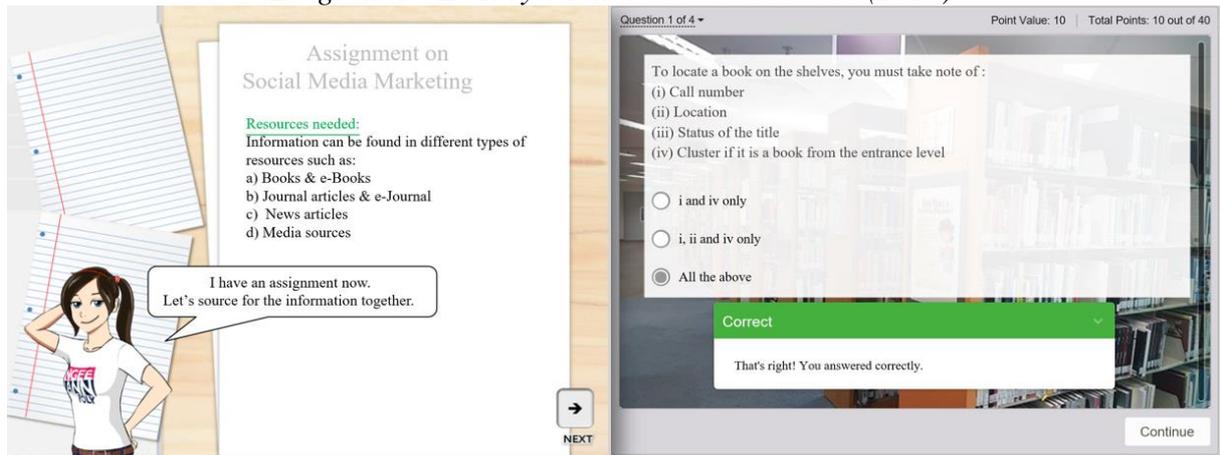
In 2017, the team explored the use of iSpring Suite E-Learning Authoring software. The software provided features to convert PowerPoint presentations into multimedia e-courses. The e-Learning courseware was built as a SCORM package and answers to quiz questions were tabulated in Blackboard's Gradebook. The e-Learning courseware incorporated some content on basic information literacy skills as shown in Diagram 6. It was integrated into common modules identified by all Schools in Ngee Ann Polytechnic.

Phase 4 (2018 and 2019): Inclusion of Digital Literacy in the Library Orientation e-Learning Framework
NP Library's Digital Literacy module was designed in tandem with the Polytechnic's direction of nurturing lifelong learners to be digitally literate. This covers the ability to use digital tools to communicate, collaborate, evaluate information and learn emerging skills.

Diagram 7: DREAMS approach to Digital Literacy
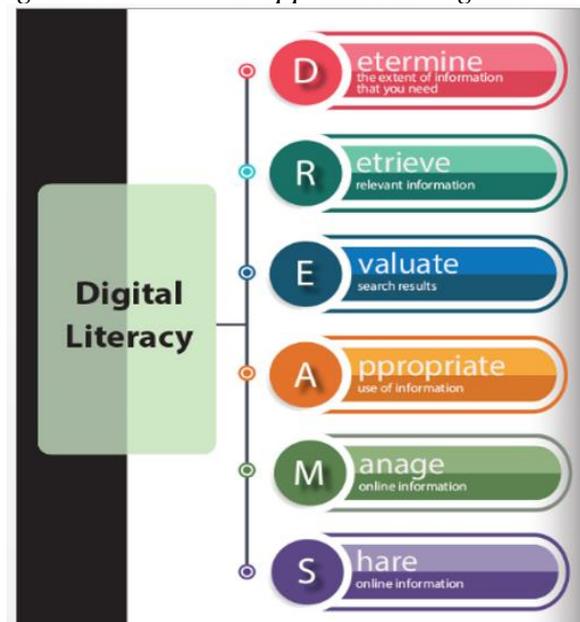
In 2018, the team created content on Digital Literacy based on six essential library skills known as the D.R.E.A.M.S approach (See Diagram 7). It includes areas such as search strategies, use of Library resources for academic information needs, evaluation of information published online, appropriate use of online information using Creative Commons and citation styles, and the management and sharing of online information.

The aim was to infuse the basic elements of Digital literacy into the Library Orientation framework so that students will be taught this skill at the onset of their studies in the polytechnic.

The contents were improved from the 2017 version of e-Learning. The storyline had two characters explaining the use of library resources as shown in Diagram 8. Incorporated within the e-Learning courseware were some quiz questions to assess students' learning, and an evaluation survey to measure the effectiveness of the programme.

Diagram 8: E-learning courseware on Digital Literacy incorporated into Library Orientation

There were approximately 1,950 Year 1 students that went through the compulsory e-Learning courseware on Library Orientation through the Blackboard Learning Management System during the April 2018 semester. The evaluation showed the following results:

➢ 84% of the students rated 7 and above (on a 1 to 10 scale in the survey questionnaire, 10 being the highest score) for their knowledge on Digital Literacy after completing the e-Learning courseware.

➢ 81% students rated 4 and above (on a 1 to 5 scale in the survey questionnaire, 5 being the most effective) on the effectiveness of the instructional design

➢ The two most frequently cited qualitative feedback were the need to shorten the content and add narration for more engagement.

Diagram 9: e-Learning courseware on Digital Life@NP™
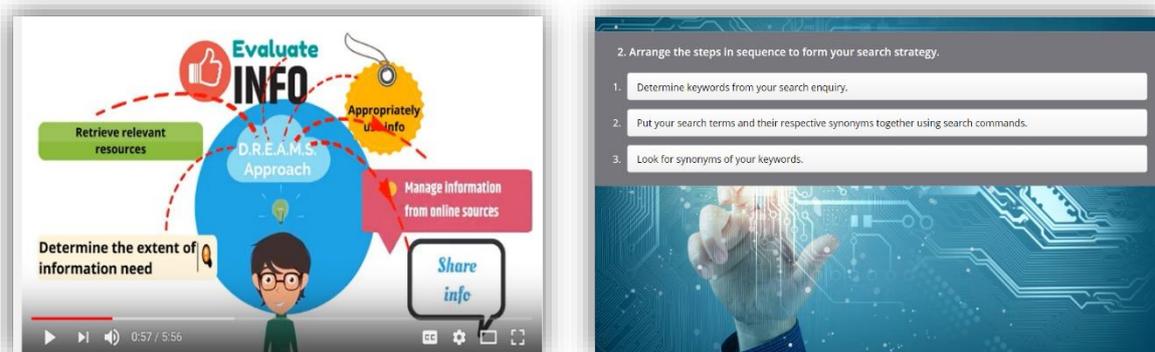
In 2019, the team enhanced the development of the e-Learning courseware further by using the latest version of iSpring Suite (version 9.0) as shown in Diagram 9. Animated instructional videos using Animaker, a video production tool and interactive quiz assessments were added. The Library Orientation was rebranded as, **Digital Life@NP™**, a one-stop digital literacy framework in line with the Polytechnic's Graduate Competencies. It covers a suite of bite-sized e-learning packages on Digital Literacy and Cyber Wellness which the Library has collaborated with the schools and industry partner such as the Media Literacy Council (MLC). The e-Learning was rolled out to 4,150 Year 1 students in April 2019 semester.

Conclusion

The e-Learning development in Ngee Ann Polytechnic is a journey and not a destination. Along the e-Learning journey, there were a number of stop points at each phase of development for the team to reflect on the content and instructional design and make continuous improvements.

In the next phase of the e-Learning journey, the Library will develop more online videos. These include the conversion of some of its contents into bite-sized videos to lighten students' cognitive load and increase their learning retention.

The effectiveness of e-Learning courseware for Library Orientation is still a topic of ongoing debate in the literature as there are conflicting schools of thoughts. However, the team concludes that e-Learning is a more sustainable model especially when there are constant efforts to improve on the instructional design. A blended approach using e-Learning and learning journey around the Library will be adopted in the succeeding phase of the Library Orientation programme. In addition to the e-Learning courseware, the team will be using Landbot.io, an intuitive conversational chatbot builder to create a conversational website which is accessible via mobile phones for its learning journey activity.

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