

DIGITAL INNOVATION IN TEACHING AND LEARNING: SWOT-THEMATIC ANALYSIS

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Abstract

This research aims to find out the relevancy of the newly introduced Digital Innovation course for Semester 2 Year 3 PISMP students at a Teacher Education Institute. Qualitative data of students' feedbacks were collected using the SWOT framework. Thematic analysis was used to analyze the qualitative data. Five THEMES have been identified for the Strength (S) but only one THEME being identified for the Weakness (W) of the course. This indicated that the course has benefited the students and they gave positive feedback towards the course. The course was also found to provide many opportunities (O) for students to do and practice innovation. Some threats (T) have been identified as well but these were seen to be minor and can be addressed if the appropriate measures that have been suggested can be taken. This research has provided useful feedbacks and insights to show that the introduction of Digital Innovation course is relevant. Entrance-exit survey for the course is excellent further supported the relevancy of the course.

Keywords: Digital innovation, SWOT, Thematic analysis

INTRODUCTION

Institut Pendidikan Guru Malaysia (IPGM) as the Leader of Excellence in Teacher Education has been given the mandate by Ministry of Education (MOE) Malaysia to train degree holder primary school teachers. Program Ijazah Sarjana Perguruan (PISMP) is a degree programme to train teachers to teach in primary school for various subjects. Courses offer through the programme are intended to give knowledge and provide experience related to the teaching professions for future teachers (Kementerian Pendidikan Malaysia, 2017).

Program Education Objectives (PEOs) are statements that described the expected education outcomes need to be achieved by every graduate of a PISMP academic program after graduation and have been working for 3 to 5 years. One of the PEOs of the Teacher Education Program is to enable teachers to generate problem solving solutions (PLO3) for teaching through scientific (LO3) approach in an innovative, creative and ethical manner (Kementerian Pendidikan Malaysia, 2017).

PLOs are statements that describe learning outcome which need to be achieved by every student at the end of completing all curriculum courses offered for an academic programme. PLO3 is the application of self reflection, problem solving skills, scientific skills and creative thinking in teaching. For the first time starting from the academic year 2018, a course Digital Innovation has been introduced to all the students in Semester 2 Year 3 of the PISMP programme. This course provides opportunities for students to explain the concepts and the processes of innovation; generate ideas in developing innovation project; prepare, develop and

implement innovation project for teaching and learning; promote, market and evaluate innovation project. Students (student teachers) are expected to apply critical thinking and problem solving skills, communication skills and entrepreneurial skills during the course (Kementerian Pendidikan Malaysia, 2017). They are being assessed 100% based on coursework, which is to produce a digital innovation based on teaching and learning issues. This research aims to explore both the benefits and the potential drawbacks of the Digital Innovation course which was taught from January to April 2018. SWOT framework was used to collect feedbacks from students and Thematic analysis was used to analyze the data into identified themes.

DEFINITION AND CONCEPT OF INNOVATION

Organization for Economic Cooperation and Development (OECD) defines innovation as a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” (OECD, 2005, p. 46). Definition of innovation by Yayasan Inovasi Malaysia (2010) described that creativity is a thinking process whereas innovation is a productive process. Application of creativity is defined as innovation. Any ideas with added values will become innovations. Innovation is the product of creative idea. Oslo Manual (OECD, 2005) has described different types of innovation as below:

Product innovation

A good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, software in the product, user friendliness or other functional characteristics.

Process innovation

A new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

Marketing innovation

A new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

Organizational innovation

A new organizational method in business practices, workplace organization or external relations.

SWOT ANALYSIS

SWOT analysis focuses on the following four elements: Strengths (S), Weaknesses (W), Opportunities (O) and Threats/challenges (T). Rouse (2013) defines them as follows:

- Strengths: the internal attributes and resources that support a successful outcome.
- Weaknesses: the internal attributes and resources that work against a successful outcome.
- Opportunities: the external factors the project can capitalize on or use to its advantage.

- Threats/Challenges: the external factors that could jeopardize the project.

This section will describe a few research that have used SWOT analysis framework in the field of education. Susan, *et al.* (2013) has carried out a research to study peer review of teaching (PRT). Five themes are used to determine the feasibility of PRT. Data were analyzed based on PRT and SWOT framework. 27 studies were selected for content mapping. Results of the analysis has revealed a positive strategy in promoting PRT in higher education. Another research carried out by Merkulova Edita and Nenasheva Tatiana (2016) had used SWOT analysis to analyze and identify the major challenges posed by the introduction of a new subject into the university curriculum. Results of the research have shown that SWOT analysis can be used for course and course materials design in the field of education. Vitan (2017) carried out a research to study the performance of pre-university education which also use SWOT analysis as a tool. Sources of data obtained for analysis were from bibliographic references, collected and processed information as well as factual documentation in the pre-university education institutions. SWOT analysis has provided an overview of the quality of the activity of the institutions as well as of the performance in the management of the resources and the implementation of modern systems necessary for the strategic and decision-making management. SWOT data could offer insights that should be supported (i.e. potential), 'opportunities' that have to be sought (i.e. prospects), 'weaknesses' that must be overcome (i.e. barriers), and 'threats' that ought to be alleviated (i.e. hindrances) (Tasos, 2015). In this research, SWOT framework is proposed to be used to collect qualitative feedback from the students regarding Digital Innovation course for further analysis.

THEMATIC ANALYSIS

Thematic analysis is the process of identifying patterns. It is not tied to a particular epistemological or theoretical perspective. Thematic analysis can be carried out in many different ways (Boyatzis, 1998; Alholjailan, 2012; Javadi & Zarea, 2016). This research follows Braun & Clarke's (2006) 6-step framework. It offers a clear and usable framework for doing thematic analysis. Braun & Clarke's six-phase framework for doing a thematic analysis is as follow:

- Step 1: Become familiar with the data,
- Step 2: Generate initial codes,
- Step 3: Search for themes
- Step 4: Review themes,
- Step 5: Define themes,
- Step 6: Write-up.

The goal of a thematic analysis is to identify themes, i.e. patterns in the data that are important or interesting. The themes are used to address the research issue. Good thematic analysis should interpret and make sense of the data instead of just simply summarizing the data. There are two level of themes (Braun & Clarke, 2006): semantic and latent. Semantic themes look at explicit or surface meanings of the data. Latent looks beyond what has been said. It will identify or examine the underlying ideas, assumptions and conceptualizations that give information to the semantic content of the data.

Thematic analysis has been applied in the field of education as a qualitative approach to analyze data. A small number of participants were enough to carry out the research. This section will describe a few educational research that analyzed data using the thematic approach.

Sofia Oikonomou (2012) carried out a research to study Greek academic teachers' perceptions and experiences in the field of outdoor education. Eight academic teachers from a Greek university took part in the research. A qualitative approach of semi-structured interviews was carried out. Thematic analysis was used to analyze the data and four themes that illustrated teachers' opinions were identified. Research findings have provided some insights into the benefits and barriers of outdoors education.

Yukhymenko *et al.* (2014) carried out a research to investigate teachers' instructional practices and students' responses towards Problem-based learning (PBL). A qualitative method of using inductive and deductive thematic analyses were used to analyze field notes and transcripts of video observations of four PBL classrooms. A number of specific instructional practices of teachers, as well as responses that students might engage in during PBL instructions were identified. These findings could help new PBL teachers to develop their skills to facilitate student-centered classrooms learning.

Another research was carried out by Ahmed Frewan (2015) to find out how EFL teachers perceive the idea of teaching communication strategies in their classrooms. Thirteen EFL teachers from two universities in the United Kingdom took part in the study. Semi-structured interviews and classroom observations were used to collect data. Data collected were analyzed using thematic analysis (Braun & Clarke, 2006). Research findings revealed that EFL teachers in some universities in the United Kingdom recommend and support the teaching of communication strategies.

Simone (2017) carried out a research to study teachers' experiences of implementing a growth mindset programme. A qualitative research using semi-structured interviews was used to collect data. Eight teachers were involved in the study. Four themes reflecting teachers' experiences were taken from the data using thematic analysis. Implications of these themes highlight the need for relevant teacher training and the importance of parental involvement in growth mindset programmes. Based on the reviews, it is relevant that thematic analysis to be proposed for use as the method to analyze qualitative data obtained from SWOT framework in this research. Thus, a SWOT-Thematic qualitative method will be used to collect and analyze qualitative data in this research.

METHOD

The researcher was teaching the Digital Innovation course for two groups of PISMP undergraduate students. The groups consisted of a total 30 of students. Digital Innovation is a two credits course in which two hours of face to face interactions that cover lectures and tutorials was conducted every week. Students were being exposed to various online digital tools that can be used for their innovation projects. They were being guided from the beginning to relate the project to solve teaching-learning problems which they have identified during their first practicum or from issues identified through literature reviews. Students were given two months to prepare a proposal for their project. A prototype of the innovation was prepared based on the proposal which was evaluated through test-runs in schools. The test-run results were documented and submitted as a report for assessment. Finally, students present their innovations orally through an exhibition.

At teacher education institute, each course will be evaluated by students before and after taking the course through an entrance-exit survey. The survey collects data regarding students' evaluation on the course. This will be part of the data used to further improve the quality of a

program at the institute. The entrance-exit survey for the Digital Innovation course for the two groups of students obtained an average score of 3.85 and 3.72 respectively. Based on the grading scale for the score, it indicates that the course is excellent as shown in Table 1. These scores and grading scales were obtained from the official portal for examination, Sistem iTemS (www.items-ipgm.edu.my). Towards the end of the course, SWOT framework was used to collect feedback from every student on the Digital Innovation course that they have taken for the semester. Thematic analysis was carried out to identify themes for students' feedback for each strength, weakness, threat and opportunity quadrant of the SWOT framework. The following section will describe the SWOT-Thematic analysis of the data in detail.

Table 1

Entrance-exit Survey Scoring Scale

Poor					Fair	Good	Very Good	Excellent
-4	-3	-2	-1	0	1	2	3	4

SWOT-THEMATIC ANALYSIS OF STUDENTS' FEEDBACK ON DIGITAL INNOVATION

SWOT data collected from the students were analyzed using Braun & Clarke's (2006) 6-step framework as described above. The analysis in this research identifies themes at the semantic level. For internal factors, more THEMES for Strengths (S) have been identified compared the the Weaknesses (W). As for external factors, almost equivalent number of THEMES have been identified for both Opportunities (O) and Threats (T). A common THEME that has been identified to appear in all the four quadrants of the SWOT framework is "technology competency". This is inline with the facts that the course requires students to have some level of technology competency to enable them to create digital innovation. It has become a strength for students when they have improved their technology skills at the end of the course but will become a weakness of themselves if they do not have the competency. On the other hand, a technologically conducive environment has provided them with lots of opportunities to explore and use the technology for digital innovation. It becomes a threat when the environment is the reverse. The THEMES that have been identified for each SWOT quadrant were summarized and shown in Table 2.

Table 2

SWOT-Thematic Analysis Summary

SWOT	THEME
Strengths (internal factors)	Digital Innovation Awareness, Knowledge and Skills
	Technology Competency
	Research Awareness
	21 st Century Skills Acquisition
	Teaching and Learning Skills
Weaknesses (internal factors)	Technology Competency
Opportunities (external factors)	Innovation Competency
	Technology Competency
	Teaching and Learning Skills
Threats (external factors)	Time Limitation
	Innovation Skills

	Infrastructure
	Technology Competency

Strength (S) – Theme: Digital Innovation Awareness, Knowledge and Skills

The analysis showed that students have benefited a lot from the course. It has created digital innovation awareness among the students to use technology for teaching. Besides, students have also acquired innovation knowledge and skills through the course. Students have applied the knowledge and skills to create their digital innovation. It was observed by the researcher that majority of students were able to produce high quality digital innovation that can be used for teaching and learning. Indeed, one student from the two groups have won the second place and three others as winners in the top ten list during a Digital Innovation Competition held in conjunction with the #Innocate 2018 carnival at the institute. The competition had 30 participants who were shortlisted from a total of 74 students taking the Digital Innovation for the 2018 semester. At the end of the course, students have become more confident in using digital innovation for teaching and learning in the future. Feedbacks given by the students for the Theme “Digital Innovation Awareness, Knowledge and Skills” were listed as below:

Awareness:

“Create awareness on self ICT competency to use digital technology for teaching.”

“I have the opportunity to learn to be a good learner of digital innovation. Not only that, it gives me the opportunity to discover more application tools that are applicable to our course.”

Knowledge

“Acquire a lot of new knowledge.”

“Add up the knowledge of technology.”

“Various knowledge to create digital innovation have been learnt.”

“Acquire new knowledge on digital innovation in classroom teaching.”

“Knowledge gained is able to prepare student teachers for future use in education.”

“Good exposure to digital innovation for student teachers.”

“Innovation for teaching can be done in the future.”

Skills

“Learn new digital tools.”

“I learned about using various digital mediums to come up with innovations.”

“I learned how to create innovation using digital technologies.”

“I become more creative and innovative.”

“This course taught me to be more creative.”

“Able to produce digital innovation individually.”

“I was able to produce a digital innovation for teaching and learning.”

"I was able to use the relevant digital technology for teaching and learning."

"Produce a good digital innovation."

Strength (S) – Theme: Technology Competency

Students have improved their ICT skills in teaching and learning. They have enhanced their use of technology and become a more competence teacher in terms of using technology for teaching. Feedbacks from the students identified for the Theme "Technology Competency" were listed below.

"Improve ICT skills in teaching and learning."

"Enhance technology use for teaching and learning."

"The course helps me to be a more competence teacher."

"I can learn some of the softwares that teachers can use for lesson."

"Provide opportunities for students to acquire technological skills creatively."

"Eager to learn as many digital applications as possible for innovation."

Strength (S) – Theme: Research Awareness

The course has made students to be more aware of how to do research. The course has provided an early exposure for them to do action research during the final semester. They have a much clearer information on how to do research and this enable them to further their studies in the future. Feedbacks from the students identified for the Theme "Research Awareness" were listed below.

"Provide early exposure to action research preparing students for the final semester."

"Provide clearer information on research that enable students to further studies in the future."

Strength (S) – Theme: 21st Century Skills

The course also promoted high order thinking skills when students carried out their innovation project. They have to analyze and think critically when trying to solve problems for their innovation projects. Feedbacks from the students identified for the Theme "21st Century Skills" were listed below.

"This subject promotes Higher Order Thinking Skills by innovating new projects."

"Digital Innovation in Teaching and Learning is a subject that requires higher order thinking skills, how to analyze critically and problem solving."

Strength (S) – Theme: Teaching and Learning

This course has helped to better equipped students to teach with technology. They are able to apply digital innovation during practicum/in class. Feedbacks from the students identified for the Theme “Teaching and Learning” were listed below.

“Able to apply digital innovation during practicum/in class.”

“This course has helped to better equipped me to teach with technology.”

Weakness (W) – Theme: Technology Competency Deficiency

The only weakness identified from thematic analysis is “Technology Competency Deficiency”. This course required the students to have a certain level of technology competency to produce digital innovation. Students with low ICT skills competency and those who were slow in acquiring the skills or with limited ICT skills have reflected these as their own weakness. Feedbacks from the students identified for the Theme “Technology Competency Deficiency” were listed below.

“Low ICT skills competency.”

“A lot more skills need to be learned.”

“Slow in using some of the ICT mediums.”

“Shallow knowledge on ICT used for teaching and learning.”

“Face difficulties in choosing the appropriate technology for the innovation.”

Opportunities (O) – Theme: Innovation Competency

This course provided the opportunities to expose students to many new digital applications which can be used innovatively for teaching and learning. They have the opportunity to know of the abundance of new materials that can be used to innovate teaching and learning. Feedbacks from the students identified for the Theme “Innovation Competency” were listed as below.

“Exposure on integrating ICT to teach.”

“Abundance of new materials to improve teaching and learning.”

“Lots of new inventions to choose from, allowing expansion of ideas.”

“A lot of useful input regarding digital innovation for teaching and learning.”

“Exposure to a lot of digital applications that can be used for teaching and learning. “

“Digital innovation helps future teacher to cater to the needs of 21st century learning.”

“Many resources for teaching are developed during the course which are useful for teachers.”

Opportunities (O) – Theme: Technology Competency

The course has provided opportunities for students to explore and discover new technologies for their innovation projects. Students were applying the 21st century skills during the course. This has been identified as one of the strengths that the students have. Feedbacks from the students identified for the Theme “Technology Competency” was listed as below.

“A lot of new technologies can be explored and discovered by students for their projects.”

Opportunities (O) – Theme: Teaching and Learning

Students were able to foresee that digital innovation can facilitate teaching and learning in the classroom. For them, digital innovation could help to make teaching and learning more interesting. Feedbacks from the students identified for the Theme “Teaching and Learning” were listed as below.

“Digital innovation can facilitate teaching and learning in the classroom.”

“Help to make teaching and learning to be more interesting.”

Threats (T) – Threat: Time Limitation

Among all the threats that have been identified, the most critical being time limitation. More time was needed by students to complete digital innovation project. As completing the project required both technological and innovation competency, this finding could be linked to the “Technology Competency Deficiency” and “Low Innovation Skills” which were identified as threats also for the course. Even though strengths like “Digital Innovation Awareness, Knowledge and Skills” and “Technology Competency” have been identified, these have become threats for those students who were slow in mastering the two skills. Feedbacks from the students identified for the Theme “Innovation Competency” were listed as below.

“Limited time.”

“Time is the enemy factor.”

“Allocated more time for project.”

“Time allocation for the project is insufficient.”

“The time allocated for the project is quite limited.”

“Short of time to expose all tools that can be used.”

“Longer time is needed to produce quality digital innovation.”

“Time allocation is too short to complete the digital innovation project.”

“The time allocate for the course is not enough to learn about all softwares.”

“Quality of the project might be affected due to the insufficient time allocation.”

“Insufficient time allocated (2 credits only for such a heavy and time-consuming course).”

Threats (T) – Threat: Technology Competency Deficiency

Exposing students to too many digital applications during the course has become a threat. The threat could originate from slow mastery of the digital applications by the students. Besides, students also gave feedback that they have little exposure to online applications. The vast exposure to digital applications in such a short period of time has caused them to face difficulty to comprehend and master the input, thus becoming a threat for them. Feedbacks from the students identified for the Theme “Technology Competency Deficiency” were listed as below.

“Little exposure to online applications.”

“Too many digital applications input to master.”

Threats (T) – Threat: Low Innovation Skills

The threat from “Technology Competency Deficiency” has caused “Low Innovation Skills” to emerge. This is natural for the fact that students need to have technology competency to enable them to complete innovation successfully. Students are expected to have some level of technology competency from the pre-requisite course that they have taken earlier. Thus, the content of the course does not have any topic related to technology. This will justify for students’ feedback stating that “The topics mostly are not related to technologies discovery.” Feedbacks from the students identified for the Theme “ICT Competency Deficiency” was listed as below.

“The topics mostly are not related to technologies discovery - difficulties in choosing innovation.”

Threats (T) – Threat: Infrastructure

The threat from “Infrastructure” for matter related to computer technology is not a new issue. This has been the major problem faced by many who want to use computer technology for teaching but had been held down by poor infrastructure. The main issue related to this threat is poor internet access. Students have to resort to using their own wifi when facing internet access difficulty using free wifi of the institute. Feedbacks from the students identified for the Theme “ICT Competency Deficiency” was recorded as below.

“Poor internet access.”

IMPLICATIONS FROM THE FINDINGS

Based on the findings and discussion on SWOT-Thematic analysis of the data, it showed more positive outcomes were obtained from Digital Innovation course compared to the negatives. This supports entrance-exit survey data for the course which indicates that it is excellent. This indicates that the structure of the course is relevant. This also means that the objectives stated in the course mostly have been achieved. Among the main objective that has been achieved by the students was that they were able to produce innovation based on teaching and learning problems. This objective alone has seen the many strengths students acquired during the course. The course has helped students to improve on their innovation and technology competency. They have also improved on their teaching and learning skills using digital innovation. The course could benefit students more if the identified external threats can be addressed. It can be made into a 3 credits course by giving more face to face time to do practical for the project. This suggestion is to address the time limitation issue identified. The threat that come from poor infrastructure could only be overcome if there is allocation given to upgrade it. Students have to work extra hard to overcome the threat that comes from innovation and technology competency deficiency. In short, the course is relevant and will be even better if the threats that have been identified can be addressed accordingly.

CONCLUSION

This research has successfully collected qualitative feedback data on Digital Innovation course from Semester 2 Year 3 PISMP students using the SWOT framework and analyzed the qualitative data using thematic analysis. The main objective of this research is to find out how relevance is the new Digital Innovation course. More THEMES for strength (S) have been identified compared to the weakness (W). This shows that students have benefited more from the course. Besides, the course was also found to provide many opportunities (O) for students to do and practice innovation which has helped them to improve their skills in these two aspects. Some threats (T) have been identified as well but these were seen to be minor and can be addressed if the appropriate measures that have been suggested can be taken. As conclusion, SWOT-Thematic analysis that have been carried out in this research is successful. It has provided useful feedbacks and insights to show that the introduction of Digital Innovation course is relevant.

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