Educator's Readiness for the Implementation of Micro-Credentials in Terms of Knowledge, Skills, and Attitudes for Design Programs in Polytechnics

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Abstract

The increase in the need to integrate micro-credentials in higher education has led to the need to conduct a study to understand the readiness of teachers for the development of micro-credentials. This study was conducted with the aim of identifying the perception of polytechnic instructors towards the implementation of micro-credentials in design programs in terms of knowledge, skills, and attitudes. The design of the study was a survey with a quantitative approach that used questionnaires as the main instrument, this study involved a total of 79 teaching staff respondents from three polytechnics in the states of Johor, Pahang and Penang, namely Ibrahim Sultan Polytechnic, Muadzam Shah Polytechnic and Tasek Gelugor Metro Polytechnic. The actual results of the study showed that the perception of the level of knowledge, skills and attitudes was at a moderate level. Correlation analysis showed that there was a significant relationship between knowledge and attitude while there was no significant relationship between knowledge and skills. The implication is that these results can assist policymakers and management of educational institutions in strategizing more effective implementation of micro-credentials as well as improving professional development programmes for teachers, in order to improve the quality of learning and teaching relevant to current industry needs.

Keywords: Attitudes; Educator's Readiness; Knowledge; Micro-Credentials; Skills.

1.0 Introduction

Micro-credential (MC) is gaining global attention as a flexible learning mechanism that addresses the evolving needs of students and industry. Its prominence in higher education began around 2020, mirroring the earlier rise of interest in MOOCs in 2012 (Moodie, 2012). Designed to provide shorter, certified, and skills-focused learning opportunities, MCs have become increasingly relevant in a competitive job market (Chakroun & Keevy, 2018). In Malaysia, the Malaysian Qualifications Agency (MQA) reinforced this initiative through the release of guidelines in May 2019, defining MC as a mini-certification that validates specific skill mastery (MQA, 2020). The rapid technological advancement in education aligns with the Malaysian Education Development Plan 2013–2025, particularly through the Globalized Online Learning initiative under the 9th surge (N. A. Abdullah et al., 2023). Within Technical and Vocational Education and Training (TVET), where practical learning is emphasized at 70% compared to 30% theory, MCs play a critical

role in equipping students with industry-relevant skills and improving their employability (Abdul Aziz Ishak & Ahmad Talaat, 2020). Nevertheless, successful implementation depends heavily on instructors' readiness to adopt digital learning methodologies.

The concept of micro-credentials (MCs) originated from earlier developments such as "Digital Badges" and "Short Online Courses," which have been utilized since 2004 (Brown et al., 2021; Chakroun & Keevy, 2018). The term "micro-credential" itself was first introduced in 2013, with early adoption seen in countries like the United Kingdom, United States, Australia, India, and Canada. Digital Badges (DBs), which serve as digital recognitions of skills and achievements, have been integrated into educational practices to enhance learner motivation and outcomes (Gregg et al., 2022; Kayyali et al., 2023). The growth of MCs is also linked to the expansion of MOOCs and Home-Based Learning (HBL) as flexible and effective learning alternatives (Li et al., 2020). Despite their benefits, the implementation of MCs in the Technical and Vocational Education and Training (TVET) sector faces significant challenges, including educators' limited knowledge of MC modules, inadequate digital competencies, and resource constraints (Che Ahmat et al., 2022; Varadarajan et al., 2023). The shift from conventional to digital teaching approaches demands that instructors recognize the crucial role of technology integration to ensure the success of MC-based education (Simsek & Yazar, 2019).

Micro-credentials are a key innovation in higher education, offering flexible and industry-relevant learning opportunities. Their effective implementation depends on instructors' readiness in knowledge, digital skills, and positive attitudes toward online learning. Therefore, educational institutions must provide sufficient training and technical support. With a strategic approach, micro-credentials can enhance graduate employability and strengthen Malaysia's TVET education system.

2.0 Methodology

The design of this study is quantitative in the form of a correlation questionnaire by identifying the readiness of Polytechnic educators. to implement *Micro-credentials* for the Design Program in terms of knowledge, skills and attitudes. In this study, the researcher has used descriptive analysis methods mainly to collect information about the demographics of students or the sample being studied for the purpose of explanation and interpretation. The researcher selected the number of study samples by referring to Krecjie & Morgan (1970) based on the reference of Chua (2021). According to the sample size selection recommendation by Krejcie and Morgan, (1970), the minimum size for this study was 126 teaching staff. Therefore, the total sample size required according to Krejcie and Morgan's schedule is (n=96) instructors from the original total population size of (N=126) educators.

Sample size is calculated using the stratified sampling formula referenced from Ahmed, (2024)

$$n_h = \frac{N_h}{N} \times n$$

$$n = 79$$

Where,
n_h = sample size of stratum h
N_h = population size of stratum h
N = total population size
n = entire sample size

Therefore, the total population of teaching staff at these three polytechnics is 126. The total number of respondents who answered the questionnaire for this study was 79 respondents, resulting in a response percentage of 62.69%. The number of respondents who answered the questionnaire out of the required 126 people was sufficient because a percentage of more than 60% was acceptable in research for the social sciences (Babbie, 2015).

Data collection was conducted through a questionnaire developed based on adaptations from previous studies (Lai et al., 2020) and have been modified according to the purpose of this study.

3.0 Result and Discussion

The analysis of this study is divided into five sections which is the demographics of respondents, the perceptions Polytechnic educator's knowledge, skills and attitudes level on the implementation of Micro-Credentials in design programs, The second part of this topic will explain the inferential analysis to identify the relationship between educator's knowledge, skills, and attitudes on the implementation of Micro-credentials in design programs.

3.1 Respondents Demography

Based on Table 1, the demographic analysis reveals that the majority of the respondents were female, comprising 45 individuals (57.0%), while male respondents totaled 34 individuals (43.0%). In terms of academic qualifications, most respondents held a Master's degree (39 individuals, 49.4%), followed by those with a Bachelor's degree (34 individuals, 43.0%), and a smaller number holding a Doctor of Philosophy (PhD) degree (6 individuals, 7.6%). This indicates that the respondents were generally well-qualified, with postgraduate qualifications dominating the sample.

Regarding service period, the highest number of respondents had served between 10 to 15 years (27 individuals, 34.2%), followed by those with more than 16 years of service (24 individuals, 30.4%). A total of 17 respondents (21.5%) had five years or less of service, while the smallest group had served between 6 to 10 years (11 individuals, 13.9%). In terms of institutional distribution, Politeknik Ibrahim Sultan recorded the highest number of respondents (42 individuals, 53.2%), followed by Politeknik Muadzam Shah (27 individuals, 34.2%), and Politeknik METro Tasek Gelugor (10 individuals, 12.7%). Overall, the respondents were predominantly experienced female educators with Master's-level qualifications, mostly from Politeknik Ibrahim Sultan.

Table 1: Demographic Findings of Respondents

Demographics	Frequencies	Percentages (%)
Gender		
Male	34	43.0
Female	45	57.0
Education Level		
Bachelor's Degree	34	43.0
Master's Degree	39	49.4
Doctor of Philosophy (PhD)	6	7.6
Service Period at Polytechnic		
≤ 5 tahun	17	21.5%
6 - 10 tahun	11	13.9%
10 - 15 tahun	27	34.2%
≥ 16 tahun	24	30.4%
Polytechnic		
Politeknik Ibrahim Sultan	42	53.2%
Politeknik METro Tasek Gelugor	10	12.7%
Politeknik Muadzam Shah	27	34.2%

3.2 Perception of Polytechnic Educators' Knowledge Level on the Implementation of Micro-Credentials in Design Programs

The findings from Table 2 show that polytechnic educators possess a moderate level of knowledge regarding the implementation of micro-credentials (MC) in design programs, with an overall mean score of 3.10 (SD = 0.735). Five items were rated high (M = 3.71–4.01), demonstrating strong understanding of MC concepts, particularly familiarity with the concept itself (M = 4.01, SD = 0.707), confidence in developing teaching materials (M = 3.71, SD = 0.770), and applying MC in teaching (M = 3.77, SD = 0.767). However, three items scored at a moderate level (M = 2.39–2.51), indicating limited understanding of the differences between MC and conventional methods, as well as the benefits offered. Two items recorded low mean scores: knowledge of technological developments (M = 2.28, SD = 1.648) and assessment methods (M = 2.32, SD = 1.606), reflecting gaps in educators' understanding of emerging trends and evaluation strategies. These results suggest that while educators have a foundational knowledge of MCs, there is a clear need for targeted professional development to enhance their understanding of digital innovations and assessment practices necessary for effective implementation.

Table 2: Distribution of Mean Scores, Standard Deviation, and Mean Interpretation for Knowledge Items

No.	Item	Mean Score	Standard Deviation	Mean Interpretation
B1	I know about the concept of micro-credentials	4.01	0.707	High
B2	I know about the definition of micro-credentials	3.89	0.716	High
B3	I learned about the latest technological developments related to micro-credentials.	2.28	1.648	Low
B4	I have the knowledge to provide a variety of learning activities based on the concept of micro-credentials.	3.71	0.754	High
B5	I have no problem applying micro-credentials in teaching and learning.	3.77	0.767	High
B6	I know the difference between the micro-credentials teaching method and the conventional teaching method	2.39	1.743	Moderate
B7	I learned that micro-credentials have many advantages	2.51	1.746	Moderate
B8	I am aware of the appropriate teaching and learning strategies to be applied in micro-credentials.	2.42	1.684	Moderate

B9	I am aware of the method for assessing student achievement based on micro-credentials.	2.32	1.606	Low
B10	I have knowledge about the development of Teaching Materials (ABBM) which is based on the concept of micro-credentials to the design subject.	3.71	0.77	High
Overall Score		**3.10**	**0.735**	**Moderate**

The study revealed that polytechnic educators have a moderate level of knowledge on implementing micro-credentials in design programs, largely due to the concept's novelty in Malaysia. This highlights the need for targeted training and exposure, as supported by Che Ahmat et al. (2022) and Pouliou (2024), who identified limited experience with educational technologies, assessment methods, and digital tools as key challenges. Addressing these gaps through institutional support, continuous professional development, and improved digital access is crucial to strengthening educators' competence, teaching quality, and graduate employability.

3.3 Perception of Polytechnic Educators' Skills Level on the Implementation of Micro-Credentials in Design Programs

The findings from Table 3 indicate that polytechnic educators perceive their skills in implementing micro-credentials at a moderate level, with an overall mean score of 3.41 (SD = 0.643). The highest-rated skills involve technical aspects such as preparing teaching materials (M = 3.77, SD = 0.767), handling instructional resources (M = 3.75, SD = 0.776), designing lesson plans (M = 3.72, SD = 0.846), and implementing learning activities (M = 3.68, SD = 0.76), demonstrating proficiency in content creation and lesson structuring. Moderate scores were recorded in adapting micro-credentials to diverse student backgrounds (M = 3.66, SD = 0.846) and integrating pedagogical and technological knowledge (M = 3.58, SD = 0.778), suggesting partial competency in these areas. However, the lowest-rated items highlight gaps in pedagogy (M = 2.34, SD = 1.616) and the integration of values in digital learning (M = 2.38, SD = 1.651), indicating a need for further training in educational strategies and value-based teaching. These findings suggest that while educators possess strong technical skills, targeted professional development is essential to strengthen their pedagogical competencies and ensure effective micro-credential implementation across diverse learning environments.

Table 3: Distribution of Mean Scores, Standard Deviation, and Mean Interpretation for Skills Items

No.	Item	Mean Score	Standard Deviation	Mean Interpretation
C1	I have the skills to implement micro-credentials based on diverse student backgrounds.	3.66	0.846	Moderate
C2	I have the skills in preparing lesson plans through micro-credentials if they are implemented.	3.72	0.846	High
C3	I have the skills in preparing teaching materials through micro-credentials if they are implemented.	3.77	0.767	High
C4	I have the skills in handling the use of ABBM to facilitate micro-credential-based teaching and learning if it is implemented.	3.75	0.776	High
C5	I often use approaches such as the concept of micro-credentials when implemented in teaching and learning.	3.54	0.859	Moderate
C6	I have skills in pedagogy based on the concept of micro-credentials	2.34	1.616	Moderate
C7	I am skilled in the application of values that are in line with the era of digital learning such as micro-credentials	2.38	1.651	Moderate
C8	I am constantly improving my micro-credentials skills to ensure a smooth teaching and learning process.	3.68	0.825	High
C9	I am skilled in implementing learning activities with the concept of micro-credentials if they are implemented	3.68	0.76	High
C10	I am proficient in the basics of Content Pedagogy Technology Knowledge (PTPK) if micro-credential-based teaching is implemented	3.58	0.778	Moderate
C11	I am proficient in the basics of Content Pedagogy Technology Knowledge (PTPK) if micro-credential-based teaching is implemented	3.44	0.902	Moderate
Overall Score		**3.41**	**.643**	**Moderate**

The study reveals that polytechnic educators possess a moderate level of perceived skills in implementing micro-credentials in design programs, with strong technical abilities in preparing teaching materials but notable weaknesses in pedagogical skills and digital value integration. This supports the findings of F. Abdullah & Ghazali (2023), who emphasized that educators proficient in technology are more inclined to adopt micro-credentials. Effective implementation requires shifts in teaching and assessment methods (Lucero et al., 2021) and strong digital competencies for designing, delivering, and evaluating micro-credential programs (Sharma et al., 2024; Tamoliune et al., 2023). Interactive teaching aids like videos, infographics, and simulations can enhance student engagement (Lang, 2022), while institutional frameworks and collaboration with industry are vital to aligning micro-credentials with market needs (Ali & Khan, 2023; Maina et al., 2022). Reed et al. (2024) further highlight that digital skills and the effective use of teaching tools are crucial for micro-credential success. Thus, continuous professional development, institutional support, and industry partnerships are essential to enhance educators' competencies and strengthen micro-credential implementation in Malaysia's higher education system.

3.4 Perception of Polytechnic Educators' Attitudes Level on the Implementation of Micro-Credentials in Design Programs

The findings from Table 4 indicate that polytechnic educators in design programs have a moderate overall attitude toward the implementation of micro-credentials, with an overall mean score of 3.10 (SD = 0.735). Positive attitudes were reflected in high mean scores related to interest in using micro-credential-based technology (M = 4.01, SD = 0.707), conducting student assessments (M = 3.89, SD = 0.716), enthusiasm for continuous learning (M = 3.77, SD = 0.767), and recognition of benefits from micro-credential-based teaching techniques (M = 3.71, SD = 0.754). However, educators expressed moderate willingness to face the challenges of micro-credentials (M = 2.39–2.51) and to participate in training (M = 2.42, SD = 1.684), while low scores were recorded for comfort in teaching with micro-credentials (M = 2.28, SD = 1.648) and perceptions of workload burden (M = 2.32, SD = 1.606). These results suggest that although educators show interest and see value in micro-credentials, concerns about readiness and workload persist, highlighting the need for targeted support, training, and workload management to promote wider acceptance and effective implementation.

Table 4: Distribution of Mean Scores, Standard Deviation, and Mean Interpretation for Skills Items

No.	Item	Mean Score	Standard Deviation	Mean Interpretation
D1	I am interested in using micro-credential-based technology in my teaching and learning.	4.01	0.707	High
D2	I am interested in implementing student assessments based on the concept of micro-credentials.	3.89	0.716	High
D3	I feel comfortable teaching design subjects related to using micro-credential-based learning methods	2.28	1.648	Low
D4	I feel that the use of teaching techniques based on the concept of micro-credentials will benefit my students.	3.71	0.754	High
D5	I'm always open to learning how to use micro-credentials on a regular basis	3.77	0.767	High
D6	I am always ready to take on the challenge of micro-credentials	2.39	1.743	Moderate
D7	I am always ready to take on the challenge of micro-credentials	2.51	1.746	Moderate
D8	I intend to participate in activities (such as workshops, seminars, conferences) related to micro-credential-based learning	2.42	1.684	Moderate
D9	I assume that micro-credential-based implementation does not burden the work of instructors	2.32	1.606	Low
D10	I think the micro-credentials approach in teaching and learning is simpler compared to the conventional approach.	3.71	0.77	High
Overall Score		**3.10**	**.735**	**Moderate**

The study reveals that polytechnic educators have a moderate attitude toward implementing micro-credentials in design programs, showing interest in technology use and willingness to adopt new methods, yet expressing concerns about workload and adapting to unfamiliar teaching approaches. Their attitudes are shaped by their understanding of micro-credential benefits, quality assurance, and institutional backing (F. Abdullah & Ghazali, 2023; Kumar et al., 2022; Maina et al., 2022). Educators with stronger digital competencies tend to be more receptive to micro-credentials (Msweli et al., 2022). Therefore, continuous professional development, structured training, and institutional support are vital to facilitate successful implementation (Tammeleht et al., 2023; McGreal & Olcott, 2022).

3.5 The Relationship Between Educator's Knowledge, Skills and Attitudes on the implementation of Micro-credentials in design programs.

Based on Table 5, the study used Spearman's Rho correlation to examine the relationships between polytechnic educators' knowledge, skills, and attitudes regarding the implementation of micro-credentials in design programs. The results show a weak and non-significant correlation between knowledge and skills ($r = 0.173$, $p = 0.128$), indicating that knowledge does not significantly influence educators' skills. However, a moderate and significant positive correlation was found between knowledge and attitudes ($r = 0.594$, $p < 0.001$), suggesting that educators with higher knowledge levels tend to have more positive attitudes toward micro-credentials. Meanwhile, the correlation between skills and attitudes was also weak and not statistically significant ($r = 0.168$, $p = 0.138$), implying that skills do not have a notable impact on attitudes. Overall, the findings suggest that enhancing educators' knowledge is key to fostering a more positive attitude toward micro-credential implementation, while skills alone do not significantly affect attitudes.

Table 5: The Relationship Between Polytechnic Lecturers' Knowledge, Skills and Attitudes on the implementation of Micro-Credentials in design Programs

Correlations					
			Knowledge	Skills	Attitudes
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.173	.594**
		Sig. (2-tailed)	.	.128	.000
		N	79	79	79
	Skills	Correlation Coefficient	.173	1.000	.168
		Sig. (2-tailed)	.128	.	.138
		N	79	79	79
	Attitudes	Correlation Coefficient	.594**	.168	1.000
		Sig. (2-tailed)	.000	.138	.
		N	79	79	79

**. The correlation is significant at the stage of 0.01 (2-tailed).

The study shows that polytechnic educators possess moderate skills in implementing micro-credentials, with strengths in technical aspects like preparing teaching materials and using digital aids, but limited pedagogical and digital value integration. Effective use of tools such as videos and simulations is vital for success. Continuous training is needed to enhance educators' digital and pedagogical competencies, while collaboration among institutions, industries, and students is crucial to align micro-credentials with market needs (Abdullah & Ghazali, 2023; Ali & Khan, 2023; Lang, 2022; Mhichíl et al., 2023; Maina et al., 2022; Naziri et al., 2019; Reed et al., 2024; Sharma et al., 2024; Tamoliune et al., 2023).

4.0 Conclusion

Overall, the study concludes that polytechnic educators demonstrate a moderate level of readiness for implementing micro-credentials, with basic knowledge, some technical proficiency, and generally positive attitudes, though gaps remain in content development, flexible learning delivery, and pedagogy. A significant relationship between knowledge, skills, and attitudes highlights the importance of strengthening knowledge to improve implementation. Therefore, strategic efforts such as continuous training, infrastructure support, and professional networks are essential. The Ministry of Higher Education should provide structured guidance and resources, while institutions must invest in digital tools and support systems. Future research should explore the impact of micro-credentials on teaching effectiveness and student careers, address reliability concerns, and encourage collaboration among key stakeholders to enhance national relevance and recognition.

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Author Contributions

K. Subaramaniam: Abstract, Introduction, Literature Review, Methodology, Results and Discussion, Conclusion and Writing; **C. C. Ng:** Data Collection.

Conflicts of Interest

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its submission and declare no conflict of interest in the manuscript.

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