

Effectiveness of MyEduSpace: An AI-Driven Integrated Digital Learning Platform for Teaching and Learning in TVET

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ABSTRACT

Lecturers and students today use many separate digital applications for notes, quizzes and group work. Switching between these tools makes a lesson harder to manage and reduces focus. This study evaluates the effectiveness of MyEduSpace, an AI-driven digital learning platform that brings several educational applications, such as ChatGPT, Canva, NotebookLM, Kahoot!, Wordwall and Padlet, together in one online space built on Google Sites. The platform was developed to make learning easier to follow, reduce the use of paper, and support a more learner-centred approach in a Technical and Vocational Education and Training (TVET) setting. A quantitative study combining a survey and a pre-test/post-test was carried out. A five-point Likert questionnaire was answered by 160 respondents: 100 community college students who used the platform in class and 60 community participants who used it in entrepreneurship and skills workshops. Learning outcomes were measured for 12 students. Data were analysed using SPSS, and learner engagement was also observed during the sessions. The results showed a high level of user satisfaction ($M = 4.45$), with the highest scores for ease of use ($M = 4.60$) and interactivity ($M = 4.55$). Student performance improved clearly, with the average score rising from 55.83% before the lessons to 87.50% after, a statistically significant gain ($t(11) = 20.45$, $p < .001$) with a large effect size. Observation also showed more active participation and two-way interaction. The study concludes that MyEduSpace improves engagement, understanding and teaching efficiency for both students and community learners, and shows strong potential as a model for digital education that supports Sustainable Development Goal 4 and national TVET digital goals.

Keywords: Digital Learning Platform, Artificial Intelligence in Education, Gamification, TVET, Academic Achievement.

INTRODUCTION

Digital technology has changed the way teaching and learning take place. Online tools are now a normal part of higher education, and Technical and Vocational Education and Training (TVET) institutions are expected to help learners gain both subject knowledge and digital skills [1]. In Malaysia, recent studies show a growing emphasis on digital learning and digital pedagogy within the TVET sector [2]. Malaysian community colleges have a special role here, because they teach enrolled students and also serve the wider community through short courses, skills training and entrepreneurship workshops. Lecturers in these settings now use many digital applications to deliver content, run assessments and support group work.

However, using so many tools has created a problem. Lecturers and learners must keep moving between separate applications for notes, quizzes, presentations and group work. This constant switching breaks the flow of a lesson and makes it harder for learners to stay focused. Cognitive load theory explains that learning suffers when mental effort is spent on tasks that are not part of the lesson itself [3]. Moving between disconnected tools is exactly this kind of unhelpful effort.

At the same time, many classrooms still depend heavily on printed materials. Printed notes and exercises are costly, hard to update and add to paper waste. The growing availability of artificial intelligence (AI) tools offers a chance to make learning more interactive and better suited to each learner [4]. However, a gap remains: few

platforms bring AI support, game-based activities and group collaboration together in one place that is easy to use for both students and community learners.

To address this gap, MyEduSpace was developed as an AI-driven digital learning platform that brings several educational applications together in one online portal. This study evaluates how effective the platform is in supporting teaching and learning. The study is guided by the following objectives:

- 1) To measure how satisfied community college students and community participants are with the MyEduSpace platform.
- 2) To examine the effect of MyEduSpace on students' academic achievement.
- 3) To examine how MyEduSpace affects learner engagement during lessons.

In line with these objectives, the study addresses three research questions: (RQ1) What is the level of user satisfaction with MyEduSpace? (RQ2) Does the use of MyEduSpace significantly improve students' academic achievement? (RQ3) How does MyEduSpace affect learner engagement during lessons?

This study is useful in three ways. In practice, it offers a model that other institutions can follow to bring scattered digital tools together. In theory, it applies ideas from cognitive load theory and technology acceptance to a combined learning platform. In policy terms, by including both students and community learners, it adds evidence relevant to Malaysia's goal of digital education, to lifelong learning, and to Sustainable Development Goal 4 on inclusive and quality education.

LITERATURE REVIEW

A. Digital Learning Platforms and Unified Environments

Digital learning platforms are now an important part of higher education, giving flexible access to content and assessment. However, research shows that simply adopting technology does not guarantee better results; the design of the platform and how its tools are organised also matter [5]. A single, unified platform reduces the effort learners spend on finding and managing tools, so they can give more attention to the lesson. This fits cognitive load theory, which explains that learning suffers when scattered or poorly designed tools force learners to spend effort on things unrelated to the lesson [3], [6].

B. Artificial Intelligence in Education

Artificial intelligence is increasingly used to personalise learning, create content and give guidance on demand. A recent systematic review of empirical studies reports that AI tools can support independent learning by giving learners immediate explanations and feedback, something that usually depends on a lecturer being available [4]. When used within a clear teaching plan, generative AI tools can help with writing notes, guiding tasks and explaining concepts, which helps learners become more independent.

C. Gamification and Learner Engagement

Gamification means using game-like elements, such as points and quizzes, in activities that are not games [7]. It is widely linked to higher motivation and participation. Recent meta-analyses report that game-based learning generally improves engagement and, in many cases, achievement, although the results depend on how well the activity is designed [8], [9]. Tools such as quizzes and interactive activities can turn passive listening into active participation.

D. Technology Acceptance, Collaboration and Community Learning

The Technology Acceptance Model explains that people are more likely to adopt a technology when they find it useful and easy to use [10]. Recent studies applying this model to AI tools have confirmed that ease of use strongly shapes whether students accept and continue to use such technology [11]. Ease of use is therefore an

important measure for any learning platform, especially when users have very different levels of digital skill. Research on collaborative learning, such as the Community of Inquiry model, also shows that meaningful interaction between learners supports deeper understanding [12]. Past studies have looked at AI tools, game-based learning and collaboration separately. Few have studied a single platform that combines all three in one easy-to-use space for both TVET students and community learners. This study addresses that gap.

METHODOLOGY

A. Research Design

This study used a quantitative design that combined a survey and a one-group pre-test/post-test. The survey measured user satisfaction with the platform, while the pre-test and post-test measured its effect on student achievement. Learner engagement was also observed during the sessions to support the findings.

B. The MyEduSpace Innovation

MyEduSpace is an AI-driven digital learning platform built on Google Sites. It brings several educational applications together in one portal that users can reach through a single link. Table I lists these applications and what each one is used for.

Table I. Components Of the MyEduSpace Platform

Component	Category	Purpose
Google Sites	Main host portal	Single access point for all tools and content
ChatGPT	Generative AI	Note generation and support for independent learning
Canva / Canva AI	Content creation	Interactive visual learning materials
NotebookLM	AI knowledge tool	Summarising and organising reference material
Kahoot! / Zep Quiz	Game-based assessment	Quizzes and game-based practice
Wordwall	Game-based activity	Interactive drills and topic reinforcement
Padlet	Collaboration	Idea sharing and group tasks
Canva Whiteboard	Collaboration	Working on ideas together in real time

Source: MyEduSpace innovation documentation.

Each AI-powered component in MyEduSpace serves a specific pedagogical function. ChatGPT supports personalised learning by allowing students to ask questions and receive explanations tailored to their level of understanding, which helps learners who need additional guidance outside of class time. NotebookLM assists with knowledge organisation by summarising and restructuring reference materials, enabling students to build structured notes independently. Canva AI supports content creation and creativity, allowing learners to design visual learning materials with AI-generated suggestions that adapt to the content they are working on. Together, these tools provide immediate, on-demand feedback and scaffold learning at an individual pace, reducing dependence on the lecturer for every step of the learning process. The game-based tools, Kahoot! and Wordwall, also embed formative feedback loops, as students receive instant results and can identify areas for improvement after each activity. This combination of AI-driven personalisation, on-demand feedback, and adaptive practice activities reflects the core principles of adaptive learning design [4], [6].

The platform was developed in seven phases, from analysing needs to sharing the platform with other institutions, and it continues to be improved over time. Table II lists these phases.

Table II. Development Phases Of MyEduSpace

Phase	Stage	Main Activities
1	Needs Analysis	Identifying teaching and learning problems through observation and feedback
2	Planning & Design	Setting goals and matching content to the Course Learning Outcomes
3	Development	Building the platform and adding the digital applications

4	Implementation	Using the platform in classes, workshops and community programmes
5	Evaluation	Measuring results through tests, a questionnaire and observation
6	Improvement	Refining the content and features based on feedback
7	Sharing & Scaling	Sharing the platform with other community colleges and polytechnics

Source: MyEduSpace innovation documentation.

C. Population and Sample

For the satisfaction survey, 160 respondents were chosen using purposive sampling, based on their use of MyEduSpace in lessons and community programmes. They formed two groups: 100 community college students who used the platform in class, and 60 community participants who used it in entrepreneurship and skills workshops. Table III shows the respondent profile. For the achievement test, the sample was 12 students who sat both the pre-test and the post-test on the same topic.

Table Iii. Profile Of Survey Respondents (N = 160)

Respondent Group	n	Where Data Was Collected
Community college students	100	Classroom teaching and learning sessions
Community participants	60	Entrepreneurship and skills workshops
Total	160	

Note: Respondents were drawn from classroom sessions and community workshops.

D. Instruments

Two instruments were used. The first was a questionnaire with a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). It covered six items: overall satisfaction, ease of use, learning interactivity, paperless learning, digital task management and internet stability. The second was a pair of achievement tests, a pre-test and a post-test on the same topic, given before and after the lessons with MyEduSpace. Notes on learner engagement were also recorded during the sessions.

E. Data Collection and Analysis

The pre-test was given before the lessons. Students then studied the topic using MyEduSpace, and the post-test was given afterwards. The questionnaire was answered after participants had used the platform. Data were analysed using SPSS. Mean scores were calculated for the questionnaire and read using three bands: 1.00–2.33 (low), 2.34–3.67 (moderate) and 3.68–5.00 (high) [13]. The pre-test and post-test scores were compared using a paired-samples test. The size of the change was measured using Cohen's d [14], and the normalised gain was calculated to show how much improvement occurred [15]. The engagement notes were grouped by theme to support the survey findings.

RESULTS AND FINDINGS

A. User Satisfaction

To answer the first research question, Table IV shows the mean satisfaction scores for the six items among the 160 respondents.

Table Iv. Mean Scores for User Satisfaction (N = 160)

No.	Item Evaluated	Mean	Level
1	Ease of use	4.60	Very High
2	Learning interactivity	4.55	Very High
3	Overall satisfaction	4.45	High

4	Paperless learning	4.40	High
5	Digital task management	4.35	High
6	Internet stability	4.10	High
	Average of all items	4.41	High

Note: Levels read using a three-band scale [13].

All six items scored within the high band. Overall satisfaction was high ($M = 4.45$), and the average across all items was 4.41. Ease of use ($M = 4.60$) and learning interactivity ($M = 4.55$) scored highest, showing that respondents found the platform easy to use and engaging. This is an important result, because the respondents included both students and community members with different levels of digital skill. Paperless learning ($M = 4.40$) and digital task management ($M = 4.35$) also scored highly. Internet stability had the lowest mean ($M = 4.10$); it is still within the high band, but it shows that the internet connection is the main practical challenge.

B. Academic Achievement

To answer the second research question, Table V shows the pre-test and post-test scores of the 12 students.

Table V. Pre-Test And Post-Test Scores (N = 12)

Student	Pre-Test (%)	Post-Test (%)	Gain (%)
S1	70	100	+30
S2	60	90	+30
S3	50	80	+30
S4	55	80	+25
S5	65	100	+35
S6	50	90	+40
S7	55	80	+25
S8	50	90	+40
S9	45	70	+25
S10	50	80	+30
S11	65	100	+35
S12	55	90	+35
Mean	55.83	87.50	+31.67
SD	7.64	9.65	5.37

Note: Mean values calculated from the individual scores shown.

Every student scored higher in the post-test than in the pre-test. The average score rose from 55.83% ($SD = 7.64$) to 87.50% ($SD = 9.65$), a gain of 31.67 percentage points. The paired-samples test showed that this difference was statistically significant, $t(11) = 20.45$, $p < .001$, with a large effect size (Cohen's $d = 5.9$). The average normalised gain was 0.72, which is in the high category [15]. After the lessons, no student remained in the failing range, and most scored 80% or above, showing a good grasp of the topic.

C. Learner Engagement

To answer the third research question, observation during the lessons and workshops showed a clear rise in active participation. Four patterns were seen again and again: more participation in learning activities; more two-way interaction between learners and lecturers; a clear preference for the digital platform over the usual methods; and high participation in quizzes and group tasks. These observations match the high interactivity score from the survey and were seen in both the student group and the community group.

D. Comparison with the Usual Methods

Table VI compares the usual way of teaching and learning with the way it works when MyEduSpace is used.

Table Vi. Usual Methods Compared with MyEduSpace

Aspect	Usual Method	Using MyEduSpace
Learning tools	Separate, unconnected apps	All tools in one platform
Teaching approach	Lecturer-led, little interaction	Learner-centred and interactive
Access to materials	Scattered, hard to find	All in one link, easy to find
Use of technology	Limited, no AI	AI support throughout
Learner engagement	Low and passive	High, active and responsive
Task management	Manual, paper-based	Fully digital and paperless
Lecturer workload	Heavy and disorganised	Lighter and better organised
Scalability	Limited to certain classes	Can be used across institutions

Source: Adapted from the MyEduSpace innovation documentation.

DISCUSSION

The findings give consistent evidence that MyEduSpace improves teaching and learning. The high satisfaction scores, especially for ease of use and interactivity, support the idea from the Technology Acceptance Model that ease of use strongly affects whether people adopt a technology [10]. This matters because the sample was varied: both students and community members found the platform easy to use, which suggests that bringing all the tools into one place lowers the barrier for users with different levels of digital skill.

The large and statistically significant rise in achievement gives direct evidence that the platform supported learning, not just satisfaction. The average gain of 31.67 percentage points, the fact that all 12 students improved, and the large effect size match recent research that links game-based and interactive learning to better results [8], [9]. The study used one group only, so the improvement cannot be credited to the platform alone. Even so, the size and consistency of the gain point to a real benefit for learning.

By bringing scattered tools into one portal, the platform appears to reduce the wasted effort of moving between separate applications, leaving learners with more attention for the lesson itself [3], [6]. The rise in active participation matches research that links AI-supported learning to higher engagement [4], and active, two-way interaction is itself known to support deeper learning in collaborative learning research [12].

The platform also has value beyond the classroom. Because both students and community members used it well, MyEduSpace is relevant to lifelong learning and community development, not only to formal teaching. Its paperless approach supports environmentally friendly practice and lowers cost, consistent with evidence that e-learning platforms can contribute to sustainable education [5]. The platform has since been used in several other community colleges and polytechnics, which shows that it can work beyond the place where it started, and it has been registered as intellectual property, which confirms that it is original work. Together, these points show that MyEduSpace supports national goals for digital education and TVET, and Sustainable Development Goal 4 on inclusive and quality education [16], [17].

Limitations And Future Research

This study has several limitations that should be taken into account when interpreting the findings. First, the achievement test used a one-group pre-test/post-test design with no control group. The improvement in scores, therefore, cannot be attributed to the platform alone; other factors such as repeated exposure to the test content and the natural learning effect of the pre-test cannot be ruled out. A future study that includes a matched comparison group would allow a stronger causal claim about the effectiveness of MyEduSpace.

Second, the sample used to measure learning outcomes was small, comprising only 12 students from a single course. While the effect size was large and the statistical result was significant, a sample of this size limits the generalisability of the achievement findings. The 12 students were drawn from one class at one community college, so it is not yet known whether similar gains would be observed across different subjects, student ability levels, or institutional contexts. To address this gap, future research should recruit larger samples spanning

multiple classes and institutions. A minimum sample of 30 to 50 students per group would provide more reliable estimates of the platform's effect on achievement, and recruiting from several community colleges or polytechnics would allow the findings to be compared across different settings.

Third, this study measured outcomes at a single point in time, immediately after the lessons. The improvements in engagement and academic performance recorded here reflect short-term gains only. It is not yet known whether learners retain the knowledge they acquired through MyEduSpace over weeks or months, nor whether the high levels of engagement observed during the lessons are sustained when the novelty of the platform has worn off. Future research should include longitudinal follow-up measures, for example, a delayed post-test administered four to eight weeks after the lessons, to assess how well learning is retained. Tracking learner engagement across multiple semesters would also show whether the platform maintains its effect over time or whether initial enthusiasm fades.

Fourth, the satisfaction questionnaire relied on self-reported data, which may be affected by social desirability bias, particularly in a classroom setting where the lecturer developed the platform. Future studies should triangulate self-report data with usage analytics, observation records, and, where possible, third-party ratings to produce a fuller picture of learner experience. Finally, investigating the individual contribution of each application within MyEduSpace — for example, whether the AI tools or the game-based tools have a greater effect on engagement and achievement — would help refine the platform and guide future design decisions.

CONCLUSION AND RECOMMENDATIONS

This study evaluated how effective MyEduSpace, an AI-driven digital learning platform, is in supporting teaching and learning in a TVET setting. The results show a high level of user satisfaction ($M = 4.45$), a statistically significant rise in student achievement (from 55.83% to 87.50%, $p < .001$), and clear observed improvement in learner engagement. By bringing AI support, game-based activities and collaboration into one easy-to-use platform, MyEduSpace reduces the problem of scattered tools and supports a more organised, learner-centred and sustainable way of learning for both students and community learners.

It is recommended that interactive quizzes be added for every topic and that the platform content be given clearer descriptions to make it easier to use. Institutions that adopt the platform should also make sure the internet connection is stable, since this was the main practical challenge in this study. With these improvements, MyEduSpace shows strong potential as a model for digital education that can be extended to other institutions and communities.

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