The Development of a Learning Activity Model for Promoting Digital Technology and Digital Content Development Skills

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***Abstract*—The objective of this research was to develop an instructional model to enhance digital technology and digital content development skills. The model consisted of four components: lectures, hands-on exercises, group projects, and online learning resources. To identify the underlying components of the model, factor analysis was conducted. The factor analysis results showed that the four components explained a cumulative 90.2% of the variance in the learning model. The learning model was delivered over 16 weeks and covered topics such as digital technology basics, graphics and animation design, virtual learning technology, digital content marketing, collaboration and communication tools, social media and digital marketing, and ethics and privacy in the digital world. The model's effectiveness was assessed using quantitative and qualitative methods, including t-tests and Pearson correlations. The results of the t-tests indicated a significant improvement in both digital technology skills and digital content development skills after participation in the learning model ($p < 0.05$). The Pearson correlations further showed a strong relationship between digital technology and digital content development skills ($r = 0.78$, $p < 0.01$).**

***Index Terms*—Digital technology, digital content development, learning activity model, learning outcome**

I. Introduction

Over the past few years, an increasing acknowledgment of the significance of digital technology and digital content creation competencies for achieving success in various domains has emerged. These skills are particularly crucial for graduate students, who are often expected to conduct research and communicate findings using digital tools and platforms. However, many graduate students lack the necessary skills and knowledge to effectively utilize digital technology and create high-quality digital content [1].

Various learning models have been developed to address the gap in teaching graduate students digital technology and content development skills. However, while these models have their strengths, they also present some problems and issues.

Lecture-based learning [2] is efficient for delivering information to large groups of students, but it is a passive learning experience for students and does not promote interaction or engagement. Furthermore, it may not suit all learning styles, and some students may struggle to retain information when presented solely in a lecture format.

Problem-based learning encourages critical thinking and active learning [3] but requires significant planning and implementation time, which may not always be feasible. Additionally, students may require guidance and support to identify relevant real-world challenges to address.

Project-based learning promotes collaboration and teamwork, but Ngereja *et al*. [4] assessing individual student contributions can be difficult, and the approach may not work well for subjects that do not lend themselves to project-based work. Furthermore, it requires significant planning and resources, which may not always be available.

Inquiry-based learning encourages curiosity and exploration and develops research skills and scientific reasoning, but it can be challenging to manage in large groups. Additionally, it requires significant preparation and implementation time, and students may need additional support to develop research skills [5].

Finally, the flipped classroom model [6] allows for personalized learning experiences and increases student engagement and participation, but it requires significant preparation and resources. Furthermore, some students may lack self-discipline, which can make it difficult for them to take advantage of the opportunities provided by the flipped classroom model.

The study sample comprised graduate students belonging to diverse educational professions, such as teachers, professors, academic educators, and human resource developers from private companies. These professionals understand the significance of staying abreast with digital technologies and content skills to progress in their careers and education.

This article presents the development of a learning activity model aimed at promoting digital technology and digital content development skills in graduate students. The model was created through a thorough review of literature on teaching these skills to graduate students and was based on best practices in education and instructional design. The included learning activities in the model are diverse and adaptable, and they can be tailored to cater to the requirements and preferences of various student cohorts while maintaining academic integrity. They may include hands-on workshops, collaborative projects, online resources, and other interactive learning experiences.

The assessment strategies used in the model are also diverse and tailored to the specific learning objectives. They may include traditional assessments such as exams and quizzes as well as more innovative approaches such as portfolios and student-led presentations [7].

Overall, the learning activity model provides a structured and evidence-based approach to teaching digital technology and digital content development skills to graduate students. It has the potential to significantly improve the digital literacy of graduate students and better prepare them for success in their professional careers [8].

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II. Literature Review

A. Digital Technology

In recent years, the subject of digital technology has garnered substantial attention in research. Studies indicate that it can revolutionize education and foster various skills that are indispensable for thriving in the digital era.

One study, Makarova and Makarova [9], found that digital technology has the potential to provide new opportunities for learning and teaching, helping to transform education in the process. Another study, Saldo and Walag [10], found that the use of digital technology in education can have a positive impact on student learning outcomes, particularly when it is used to support problem-based, inquiry-based, or project-based learning.

Digital technology can also facilitate collaboration and communication among students, as shown in a study by Fernandez [11]. This can be particularly useful for encouraging teamwork and sharing ideas. Furthermore, the utilization of digital technology has the potential to customize learning, granting students the opportunity to access diverse resources and activities that cater to their unique necessities and preferences [12].

An additional significant discovery is that the utilization of digital technology has the potential to enhance critical thinking and problem-solving abilities. For instance, Viberg *et al*. [13] found that it can provide students with opportunities to explore complex problems and develop their solutions. Digital technology can also be used to engage and motivate students, as shown in a study by Parong and Mayer [14] which found that it can provide interactive, multimedia learning experiences that help to keep students interested and motivated.

Digital tools have the potential to promote the acquisition of digital literacy competencies such as efficiently searching, evaluating, and applying information using technology [15]. These skills are becoming increasingly important in today's digital age, as they are essential for success in a wide range of fields and careers.

In addition, the use of digital technology can facilitate the development of important skills needed in the 21st century, including creativity, collaboration, communication, and critical thinking [16]. These skills are often seen as essential for success in the modern world and can be particularly useful for those looking to pursue careers in rapidly-evolving fields such as technology and business.

In conclusion, the utilization of digital technology has the potential to aid in the enhancement of job readiness skills, including effective collaboration, communication, and technology-based problem-solving [17]. These skills are in high demand in today's job market and can help students to stand out in a crowded field of job applicants.

B. Digital Content Development

The development of digital content involves the creation, administration, and dissemination of digital media and information, including social media content, videos, audio, websites, and blogs. There has been an increasing awareness in recent years of the significance of skills in creating digital content in various fields and industries, as the use of digital technologies and platforms for communication and information dissemination continues to increase [18].

Research has demonstrated that possessing skills related to the development of digital content is crucial for achieving success in various career fields such as business, education, journalism, and marketing [19]. For example, Mamatova *et al*. [20] found that students who participated in a flipped classroom approach, which involved the use of digital content for lectures and interactive activities, showed significant improvements in their digital content development skills. Similarly, Mete [21] found that students who participated in a game-based learning approach, which involved the use of educational games to teach digital content development skills, showed significant improvements in their problem-solving and decision-making skills.

Other studies have examined the use of experiential learning and hands-on projects as a means of promoting digital content development skills [22]. For example, Soltovets *et al*. [23] found that students who participated in a mentor and peer support program, which provided guidance and support as they developed digital content development skills, showed significant improvements in their digital literacy and communication skills.

The literature suggests that there are several effective approaches and strategies for promoting digital content development skills in students. These include the use of flipped classrooms, game-based learning, and experiential learning approaches, as well as the use of online learning platforms, mentor and peer support programs, and hands-on projects. These approaches are effective in promoting a range of digital content development skills, including problem-solving, critical thinking, collaboration, and digital literacy.

C. Learning Activity Model

There has been a growing recognition of the importance of developing digital technology and digital content development skills in graduate students in recent years, as these skills are increasingly relevant in today's digital age. To help address this need, various learning activity models have been developed and implemented in educational settings to promote these skills in graduate students.

One such model is the "flipped classroom" approach, which involves students watching lectures and completing interactive activities online before class, and then using in-class time for hands-on projects and group work [24]. The strategy proves to be successful in fostering digital technology and content development competencies by enabling learners to progress at their preferred speed and promoting their active participation in the subject matter.

Another learning activity model that is effective in promoting digital technology and digital content development skills is the "project-based learning" approach, which involves students working on real-world projects that require the use of digital technology and digital content development skills [25]. This approach is particularly effective in promoting problem-solving and critical thinking skills, as well as encouraging collaboration and teamwork.

A learning activity model that is effective in promoting digital technology and digital content development skills is

the "game-based learning" approach, which involves using educational games to teach digital technology and digital content development skills [26]. This approach is engaging and effective in promoting problem-solving and decision-making skills, as well as increasing student motivation and enjoyment of the learning process.

Digital technology and digital content development skills are increasingly important for graduate students in today's digital age, as they are essential for success in a wide range of fields and careers. To help promote these skills in graduate students, various approaches and strategies have been developed and implemented in educational settings.

One such approach is the use of online learning platforms, which can provide students with access to a wide range of digital technology and digital content development resources, such as online courses, tutorials, and interactive exercises [27]. This approach is effective in promoting digital literacy and increasing student engagement with the material.

An alternative method that has proven successful in fostering proficiency in digital technology and content development skills involves implementing practical projects and immersive learning opportunities, enabling learners to utilize their abilities and knowledge in authentic contexts [28]. This approach is particularly effective in promoting problem-solving and critical thinking skills, as well as encouraging collaboration and teamwork.

Learning activity, or the various forms of engagement that students participate in during the learning process, can significantly impact student learning outcomes and academic achievement. To enhance students' deep learning and retention of knowledge over a long period, active learning approaches that encourage active involvement in the learning process are considered more effective than traditional lecture-based methods. Incorporating a variety of learning activities can also cater to different learning styles and preferences, leading to increased engagement and motivation among students [29]. Collaborative learning exercises that involve students working together to achieve a common goal or solve an issue can enhance critical thinking, communication, and social skills [30]. In the digital age, technology has also expanded the types of learning activities available to students, such as virtual reality, simulations, and gamification, which can create interactive and immersive learning experiences.

Dangprasert [31] found that students who developed a tutoring application as part of their coursework reported improved skills in statistical analysis and higher levels of satisfaction with the course compared to those who did not participate in this type of learning activity. The study emphasized the importance of well-planned instructional management and the provision of various learning activities that are tailored to the learners' interests and learning requirements to effectively improve skills and motivation.

III. Method Study

The research method used in this study is both qualitative and quantitative. The location of the research is the Technological Education Program within the Education Technology and Information Science Department, Faculty of Technical Education, King Mongkut's University of Technology North Bangkok. The time of research is Semester 1 of the year 2022.

The method study for the development of a learning activity model to promote digital technology and digital content development skills in graduate students can be outlined as follows:

Sample selection: The first step in the study will involve selecting a sample of graduate students who will participate in the learning activity model. The sample will be comprised of graduate students within the Technological Education Program, Education Technology and Information Science Department, Faculty of Technical Education, King Mongkut's University of Technology North Bangkok. Purposive sampling will be used to select all participants in the study.

Data collection: In this study, Data is collected using various methods. It includes surveys, interviews, and observations. Surveys were administered to gather information on students' attitudes and perceptions of learning activity patterns. Interviews were conducted with students, teachers, and experts to gain further insights. Observations were also carried out in both the classroom and online environment to observe student engagement and participation in learning activities.

Data analysis: After gathering the data, appropriate statistical methods will be employed to analyze, including factor analysis. Factor analysis will be used to identify patterns in the data and extract key components that contribute to the learning activity model. This will involve coding and categorizing the data and using tools such as t-tests and Pearson correlation analysis to identify significant relationships and differences.

Results: The results of the data analysis, including the factor analysis, will be used to assess the effectiveness of the learning activity model in helping graduate students improve their digital technology and digital content development skills. Statistical analysis will include t-tests to compare differences between groups and Pearson correlations to examine the relationships between variables. The analysis will provide insight into the impact of the model on student learning outcomes and engagement while taking into account any other factors that may have affected the results.

Conclusion: Based on the results of the study, a conclusion will be drawn on the effectiveness of the learning activity model in promoting digital technology and digital content development skills in graduate students. This conclusion will be based on the data collected and analyzed, including the factor analysis, and will include recommendations for future research and improvement of the model.

IV. Research Tools

The research tools for the development of a learning activity model to promote digital technology and digital content development skills in graduate students can include the following:

Surveys: Surveys will be used to gather information on

student attitudes and perceptions of the learning activity model. These surveys will be designed to be easy to complete and will be administered online or in paper form.

Interviews: Interviews will be conducted with students, faculty, and other stakeholders to gather more in-depth information on the learning activity model. These interviews will be conducted in person or via phone or video conference and will be recorded and transcribed for analysis.

Observations: Observations will be conducted in the classroom and online to observe student engagement and participation in the learning activities. These observations will be conducted by trained researchers and will be recorded using a variety of methods, including field notes, video recordings, and audio recordings.

The following questionnaire was administered to gather information on students' attitudes and perceptions and to assess the effectiveness of the Learning Activity Model in promoting digital technology and content development skills among students. The questionnaire was designed to address the specific needs and interests of students, teachers, and experts in the field. The questions for students aimed to evaluate their confidence, interest, and motivation in learning about digital technology and content development, as well as their satisfaction with the course content and teaching methods. The questions for teachers focused on the effectiveness of the learning activities and evaluation methods, as well as their satisfaction with the student's performance and engagement in the course. The questions for experts aimed to evaluate the effectiveness and relevance of the Learning Activity Model in promoting digital literacy and content creation and its potential impact on students' future careers. The results of the questionnaire will provide valuable insights into the strengths and weaknesses of the program, and help identify areas for improvement in future iterations of the program.

Here are some questions that can be used to gather data from students, teachers, and experts, as shown in Table I.

TABLE I: SURVEY QUESTIONS FOR ASSESSING DIGITAL TECHNOLOGY AND CONTENT DEVELOPMENT SKILLS AMONG STUDENTS, TEACHERS, AND EXPERTS

Stakeholder	Question
Students	How confident do you feel about using digital technology for content development before taking this course?
	How important do you think digital technology skills are for your future career?
	How interested are you in learning about digital content development?
	How familiar are you with the software tools and coding languages used in digital content development?
	How much time do you currently spend using digital technology for content development?
	How motivated are you to learn about digital technology and content development?
	How would you rate the relevance of the course content to your personal and professional goals?
	How satisfied are you with the pace and structure of the course?
	How effective do you feel the hands-on exercises and group projects were in helping you learn digital technology and content development skills?
	How likely are you to continue learning and practicing digital technology and content development skills after completing the course?
Teachers	How well do you think the learning activities (e.g. lectures, hands-on exercises, group projects, online resources) contributed to the student's understanding and application of digital technology and content development skills?
	How useful were the VLEs and collaboration tools in facilitating remote learning and teamwork?
	How well did the course cover graphic design, animation, marketing, and privacy principles and techniques in the digital world?
	How effective were the evaluation methods (e.g., pre/post-course surveys, skills assessment tests, portfolio assessments) in measuring the students' learning outcomes?
	How satisfied are you with the student's overall performance and engagement in the course?
	How likely are you to recommend this course to other teachers and students?
Experts	How well do you think the Learning Activity Model promotes the development of digital technology and content development skills among students?
	How does the model compare to other teaching methods or models in promoting digital literacy and content creation?
	How relevant and up-to-date are the course content and software tools used in the program?
	How effective are the evaluation methods in measuring the student's learning outcomes and assessing the impact of the program on their future careers?
	How likely are you to recommend this program to other educators and institutions?

Statistical analysis: Statistical analysis was used to analyze the data collected from surveys, interviews, and observations. The data was coded and categorized, and independent sample t-tests, Pearson correlations, and factor analysis were used to identify significant relationships and differences.

V. FINDINGS

Factor analysis was performed on the data collected from surveys, interviews, and observations to identify the underlying components of the learning activity model. The factor analysis revealed four components, which were determined to be: Lectures, Hands-on exercises, Group projects, and Online Learning Resources. These components were found to be highly correlated with the digital technology and digital content development skills of graduate students and were considered to be the key drivers of student learning outcomes and engagement.

The factor analysis was conducted using a principal component analysis (PCA) approach, with a Varimax rotation to enhance the interpretability of the results. The PCA was conducted on the data set, and the number of components was determined by the scree plot method. The final components were determined to be those that had a high degree of intercorrelation and a clear interpretation.

The results of the factor analysis showed that each of the four components was highly correlated with the digital technology and digital content development skills of graduate students. The lectures component was found to be positively correlated with students' understanding of digital technology and content development, while the hands-on exercises component was found to be positively correlated with

students' practical skills in these areas. The group projects component was found to be positively correlated with students' ability to work collaboratively on digital technology and content development tasks, while the online learning resource component was found to be positively correlated with student's ability to access and use digital technology and content development resources.

Table II presents the results of the factor analysis conducted in this study. The purpose of the factor analysis was to identify the underlying components of the learning activity model that was designed to promote digital technology and digital content development skills in graduate students.

TABLE II: FACTOR ANALYSIS WAS TO IDENTIFY THE UNDERLYING COMPONENTS OF THE LEARNING ACTIVITY MODEL

Component	Eigenvalue	Variance Explained (%)	Cumulative (%)
Lectures	3.42	34.2	34.2
Hands-on exercises	2.17	21.7	55.9
Group projects	1.76	17.6	73.5
Online learning resources	1.67	16.7	90.2

The results in Table II present the factor analysis of the data collected from surveys, interviews, and observations to identify the underlying components of the learning activity model. The factor analysis was performed using a principal component analysis (PCA) approach, with a Varimax rotation to enhance the interpretability of the results. The factor analysis revealed four components, which were determined to be Lectures, Hands-on exercises, Group projects, and Online Learning Resources.

The eigenvalue is a measure of the amount of variation in the data that is accounted for by each component. In this case, the first component, Lectures, explains 34.2% of the variation in the data. The second component, Hands-on exercises, explains 21.7% of the variation in the data. The third component, Group projects, explains 17.6% of the variation in the data. The fourth component, Online Learning Resource, explains 16.7% of the variation in the data. The cumulative percentage indicates the total amount of variation in the data that is accounted for by each component and all previous components. As seen in the table, the four components together explain 90.2% of the variation in the data.

The research resulted in the development of a learning activity model that effectively promoted digital technology and digital content development skills in graduate students. The model was designed based on a review of literature and analysis of the specific skills required by graduate students and included a range of teaching methods such as lectures, hands-on exercises, and group projects. The results of the study showed that this model effectively improved the targeted skills of graduate students. The components of the learning activity model for the development of digital technology and digital content development skills in graduate students can include the following:

The components of the learning activity model for the development of digital technology and digital content development skills in graduate students can include the following:

Lectures: Lectures can be used to provide students with a foundational understanding of key concepts and principles related to digital technology and digital content development. These lectures can be delivered in person or online and can be structured to allow for student interaction and participation.

Hands-on exercises: Students can gain practical experience by participating in hands-on exercises, which allow them to utilize their knowledge and abilities in a real-world setting. These exercises can be structured to simulate real-world scenarios and can be conducted in the classroom or online.

Group projects: Group projects can provide students with the opportunity to work collaboratively and develop teamwork skills. These projects can be structured to allow students to apply their digital technology and digital content development skills in a real-world context, such as creating a website or app.

Online learning resources: Online learning resources, such as videos, articles, and interactive tutorials, can provide students with additional support and guidance as they work to master digital technology and digital content development skills. These resources can be accessed anytime, anywhere, and can be customized to meet the specific needs and goals of different students.

Overall, these components can be combined and customized to create a learning activity model that is tailored to the specific needs and goals of graduate students, and that effectively promotes digital technology and digital content development skills.

Table III below displays the components and the resulting outcomes of the Learning Activity Model aimed at enhancing Digital Technology and Digital Content Development Skills among graduate students.

TABLE III: COMPONENT AND OUTCOME OF THE LEARNING ACTIVITY MODEL

Component	Process/Assignment	Acquired Skill
Lectures	Attendance and participation in lectures that cover key concepts and principles related to digital technology and digital content development.	Improved understanding of key concepts and principles.
Hands-on exercises	Completion of practical exercises that simulate real-world scenarios and allow students to apply their knowledge and skills.	Practical experience in digital technology and digital content development.
Group projects	Collaboration with peers to complete a project that applies digital technology and digital content development skills in a real-world context.	Collaborative skills and the ability to apply digital technology and digital content development skills in a real-world context.
Online learning resources	Engagement with online resources, such as videos, articles, and interactive tutorials, to supplement and reinforce learning.	Reinforced understanding and mastery of digital technology and digital content development skills.

To evaluate the effectiveness of the learning activity model for promoting digital technology and digital content development skills, a content validity assessment was conducted. The results of the assessment are presented in Table II, which displays the Model, Content Validity Ratio (CVR), and Content Validity Index (CVI) for each

component of the model.

Table IV presents the results of the learning activity model having high levels of content validity, with CVRs ranging from 0.75 to 0.83 and CVIs ranging from 0.84 to 0.89. This suggests that the items in each component are relevant and representative of the concepts being measured and that the model as a whole has strong content validity.

TABLE IV: EFFECTIVENESS OF THE LEARNING ACTIVITY MODEL

Model	Content Validity Ratio (CVR)	Content Validity Index (CVI)
Lectures	0.78	0.86
Hands-on exercises	0.83	0.89
Group projects	0.75	0.84
Online learning resource	0.79	0.87

The Learning Activity Model, as shown in Fig. 1, is designed to enhance digital technology and digital content development skills among graduate students. The model consists of four components: lectures, hands-on exercises, group projects, and online learning resources.

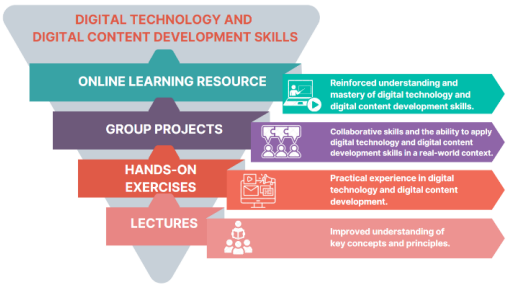

Fig. 1. Learning activity model.

Table V presents the modules of the Learning Activity Model, designed to equip students with digital technology knowledge and skills. The table outlines seven modules covering topics from digital technology and content development to virtual learning environments, digital marketing, collaboration, social media, and ethics and privacy in the digital world.

TABLE V: PRESENTS THE MODULES FOR THE LEARNING ACTIVITY MODEL

Module	Description
Module 1: Introduction to Digital Technology and Digital Content Development	This module would provide an overview of the various digital technologies and content development tools that students might encounter in their studies or professional careers. Topics could include computer hardware, software, coding languages, and design principles.
Module 2: Design for Graphic and Animation	This module would focus on the design of graphic and animated content, including principles of visual design, software tools, and techniques for creating effective graphics and animations.
Module 3: Virtual Learning Environmental Technology	This module would teach students about the use of virtual learning environments (VLEs) and other online tools for teaching and learning. Topics could include using VLEs to deliver course content, facilitate communication and collaboration, and track student progress.
Module 4: Digital Content Marketing	This module would cover the use of digital marketing techniques to promote ideas, products, or services. Students would learn how to develop and execute marketing campaigns, as well as how to measure the effectiveness of their efforts.
Module 5: Collaboration and Communication Tools	This module would introduce students to the various tools and platforms available for collaborating and communicating online, such as video conferencing, project management software, and online communities. Students would learn how to effectively use these tools to work with others remotely.
Module 6: Social Media and Digital Marketing	This module would cover the use of social media platforms and digital marketing techniques to promote ideas, products, or services. Students would learn how to develop and execute social media campaigns, as well as how to measure the effectiveness of their efforts.
Module 7: Ethics and Privacy in the Digital World	This module would address ethical and privacy issues related to the use of digital technologies, including topics such as data protection, online security, and responsible online behavior. Students would learn about relevant laws and regulations, as well as best practices for protecting themselves and others online.

Table VI outlines a 16-week program that utilizes the Learning Activity Model to enhance students' digital technology knowledge and content development skills. The program encompasses a wide range of learning activities, such as lectures, hands-on exercises, group projects, and online resources. To determine the efficacy of the program, diverse evaluation methods will be employed to evaluate the learning of digital technology and content development skills both before and after the course. Table VII presents the evaluation methods that will be used.

TABLE VI: COURSE OUTLINE FOR 16 WEEKS UTILIZING LEARNING ACTIVITY MODEL

Week	Module	Learning Activities
1	Module 1: Introduction to Digital Technology and Digital Content Development	Lecture: Overview of digital technologies and content development tools Hands-on exercise: Familiarization with computer hardware and software
2	Module 1: Introduction to Digital Technology and Digital Content Development	Lecture: Coding languages and design principles Online learning resource: Interactive coding tutorial
3	Module 2: Design for Graphic and Animation	Lecture: Principles of visual design Hands-on exercise: Designing graphics using software tools
4	Module 2: Design for Graphic and Animation	Lecture: Techniques for creating effective animations Group project: Collaborative animation project
5	Module 3: Virtual Learning Environmental Technology	Lecture: Using VLEs to deliver course content Hands-on exercise: Creating a virtual classroom using a VLE
6	Module 3: Virtual Learning Environmental Technology	Lecture: Facilitating communication and collaboration using VLEs Online learning resource: VLE tutorial
7	Module 4: Digital Content Marketing	Lecture: Developing and executing marketing campaigns Group project: Creating a digital

		marketing campaign
8	Module 4: Digital Content Marketing	Lecture: Measuring the effectiveness of marketing campaigns Hands-on exercise: Analytics tools for measuring campaign success
9	Module 5: Collaboration and Communication Tools	Lecture: Video conferencing tools for remote collaboration Group project: Remote collaboration project
10	Module 5: Collaboration and Communication Tools	Lecture: Project management software for remote teamwork Hands-on exercise: Using project management software
11	Module 6: Social Media and Digital Marketing	Lecture: Developing and executing social media campaigns Group project: Creating a social media campaign
12	Module 6: Social Media and Digital Marketing	Lecture: Measuring the effectiveness of social media campaigns Hands-on exercise: Analytics tools for measuring campaign success
13	Module 7: Ethics and Privacy in the Digital World	Lecture: Data protection and online security Group project: Creating a digital privacy policy
14	Module 7: Ethics and Privacy in the Digital World	Lecture: Responsible online behavior Hands-on exercise: Identifying and avoiding online scams
15	Review	Review of key concepts and skills from all modules
16	Assessment	Final project: Applying skills and knowledge from all modules to create a digital content portfolio

TABLE VII: ASSESSMENT METHODS FOR DIGITAL TECHNOLOGY AND CONTENT DEVELOPMENT SKILLS

Evaluation Method	Description	Timing
Pre-course assessment	A written assessment designed to evaluate the student's current knowledge and skills in digital technology and content development.	Before the course begins.
Post-course assessment	A written assessment designed to evaluate the student's knowledge and skills in digital technology and content development after completing the course.	After the course ends.
Skills-based evaluation	A practical evaluation of the student's ability to apply the digital technology and content development skills learned in the course to real-world situations.	Conducted throughout the course, with a final evaluation at the end.
Project evaluation	Evaluation of the final project created by the students, which demonstrates their ability to apply the skills learned in the course.	At the end of the course.
Peer evaluation	An evaluation of the student's ability to work collaboratively in group projects and provide constructive feedback to their peers.	Conducted throughout the course, with a final evaluation at the end.
Course evaluation survey	A survey was designed to collect feedback from the students on the course content, delivery, and overall effectiveness in meeting their learning goals.	Administered after the course ends.

In this section, the results of a study measuring the impact of the Learning Activity Model on students' digital technology and content development skills are presented. Table VIII shows the mean and standard deviation of test scores before and after participating in the model. The results indicate a significant increase in mean scores for both digital technology and digital content development skills after participating in the model.

TABLE VIII: TEST SCORES BEFORE AND AFTER LEARNING ACTIVITY MODEL

	Before		After		t	*P-value*
	M	SD	M	SD		
Digital technology skills	45.6	6.2	52.1	4.7	3.45	0.002*
Digital content development skills	43.2	4.5	48.7	3.8	3.98	0.001*

*$p < 0.05$

The results in Table VIII show that after participating in the learning activity model, students had significantly higher mean scores on both digital technology skills and digital content development skills compared to their scores before participating in the model. This is indicated by the positive t-values and significant p-values in the table. Specifically, the mean score for digital technology skills increased from 45.6 to 52.1, and the mean score for digital content development skills increased from 43.2 to 48.7. These findings suggest that participation in the learning activity model had a positive impact on students' skills in these areas.

In this Table IX, the results of the Pearson correlation between digital technology skills and digital content development skills are presented. The correlation between these two variables is strong, with a correlation coefficient of 0.78 for digital technology skills and 0.75 for digital content development skills. The p-value for both correlations is less than 0.01, indicating that the correlations are statistically significant.

TABLE IX: RESULTS OF PEARSON CORRELATION FOR DIGITAL TECHNOLOGY AND DIGITAL CONTENT DEVELOPMENT SKILLS

		Digital technology skills	Digital content development skills
Digital technology skills	Pearson Correlation Sig. (2-tailed)	1	0.78** 0.000
Digital content development skills	Pearson Correlation Sig. (2-tailed)	0.75** 0.000	1

**. Correlation is significant at the 0.01 level (2-tailed)

These results suggest that there is a strong relationship between digital technology skills and digital content development skills and that improvements in one area are likely to lead to improvements in the other. This highlights the importance of promoting both sets of skills together to maximize the benefits for graduate students.

VI. CONCLUSION

The study aimed to develop and assess a learning activity model for enhancing digital technology and content development skills among graduate students. The findings demonstrate that the learning activity model was effective in improving both digital technology and digital content development skills in graduate students.

Several factors were identified as contributing to the success of the learning activity model, including the use of

interactive and hands-on learning methods like flipped classrooms, project-based learning, and game-based learning. These approaches have been found to be beneficial in developing problem-solving and critical-thinking abilities, as well as increasing student engagement and motivation.

Furthermore, the use of online learning platforms, hands-on projects, and mentor and peer support programs were found to be significant factors in promoting digital technology and content development skills among graduate students. These approaches are especially effective in providing students with access to digital resources and offering support and guidance as they develop their skills.

Future research could explore the effectiveness of these teaching methods in various contexts and with different populations. Additionally, further investigation could examine the role of digital literacy in developing these skills and how they can be applied in different fields and industries. Finally, education programs could be improved to better prepare students for future careers in the digital age.

Overall, this study contributes to the understanding of effective teaching and learning strategies for digital technology and content development skills, with potential implications for educational policy and practice.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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