

A MOTION GRAPHICS–ENHANCED LEARNING ENVIRONMENT FOR IMPROVING UNDERGRADUATE STUDENTS’ UNDERSTANDING OF DEPRESSION IN SOUTHERN THAILAND

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ABSTRACT

Depression among undergraduate students has become an increasing concern in higher education, particularly because limited understanding of symptoms, severity, treatment options, and help-seeking channels may prevent students from recognizing and responding appropriately to mental health problems. Although motion graphics have been used as digital learning media, limited empirical evidence exists on how they can be integrated into a structured learning environment to enhance students’ understanding of depression. This study aimed to: (1) develop and evaluate the quality of a motion graphics–enhanced learning environment, (2) compare undergraduate students’ understanding of depression before and after learning through the developed environment, and (3) examine students’ satisfaction with the learning environment. The sample consisted of 160 undergraduate students selected using stratified random sampling by year of study. The research instruments included a motion graphics–enhanced learning environment, a depression understanding test, and a satisfaction questionnaire. Data were collected through a pretest, learning activities within the developed environment, a posttest, and a satisfaction assessment. The data were analyzed using mean, standard deviation, and paired-samples t-test. The findings revealed that the developed learning environment was rated at a very high level of quality. Students’ posttest scores ($M = 13.03$, $S.D. = 1.37$) were significantly higher than their pretest scores ($M = 9.63$, $S.D. = 1.67$) at the .01 level. In addition, students’ overall satisfaction with the learning environment was at the highest level ($M = 4.93$, $S.D. = 0.30$). The study contributes empirical evidence that integrating motion graphics into a structured learning environment can support mental health literacy by improving students’ cognitive understanding of depression and providing an engaging digital learning approach for higher education contexts.

Keywords: *Learning Environment; Motion Graphics; Depression; Undergraduate Students; Mental Health Literacy; Learning Outcomes*

1. INTRODUCTION

Depression has become a major global public health concern and is increasingly recognized as a significant issue among young adults and undergraduate students. Recent global evidence indicates that more than one billion people are

living with mental health conditions, with depression and anxiety among the most common mental health problems worldwide. Depression affects emotional, cognitive, behavioral, and physical functioning and can lead to negative consequences for academic performance, daily life, social relationships, and overall well-being [1]. In

higher education contexts, undergraduate students are particularly vulnerable because they often experience academic pressure, social adjustment, financial concerns, expectations from family, and uncertainty about their future. These conditions may increase their risk of experiencing depressive symptoms and highlight the need for effective educational approaches that promote accurate understanding of depression.

In Thailand, mental health problems among young people and university students have become a growing concern. A nationwide study reported that Thai university students experienced depressive symptoms in a concerning proportion, indicating that depression remains an important mental health issue in higher education [2]. In addition, evidence from Thai youth suggests that access to mental health services remains limited, with only a small proportion of students having used such services [3]. Previous studies have also reported that depression among university students is associated with academic pressure, financial difficulties, sleep problems, fatigue, family relationships, peer relationships, negative life events, and lack of social support. These findings suggest that undergraduate students are a vulnerable group that requires not only mental health services but also accessible learning resources that can improve their understanding of depression, including its symptoms, severity levels, treatment options, and help-seeking channels.

Although a growing body of research has examined depression among university students, much of the existing literature has focused on prevalence, risk factors, and service utilization. These studies provide important evidence regarding the magnitude and determinants of depression; however, fewer studies have examined how instructional design and digital learning environments can be used to promote students' understanding of depression. This limitation is important because inadequate understanding may prevent students from recognizing symptoms, reducing misconceptions, seeking help appropriately, or sharing accurate information with others.

Digital media have increasingly been used to support health communication and learning because they can present complex information in an accessible and engaging format. Among various forms of digital media, motion graphics are particularly useful for explaining abstract or sensitive topics through the integration of visual elements, text, narration, sound, and animation. Recent studies have demonstrated the usefulness of

motion graphics and animated media in health communication, including health education and informed-consent communication [4] [5]. In the context of depression education, motion-graphic media have also been shown to improve students' knowledge and understanding more effectively than traditional formats [6]. However, using motion graphics as standalone media may not be sufficient to promote systematic learning. To enhance learning effectiveness, motion graphics should be embedded within a structured learning environment that includes clear learning objectives, organized content, learning activities, assessment, and support resources.

The theoretical foundation of this study is supported by multimedia learning theory and dual coding theory. Multimedia learning theory explains that learners can better understand information when verbal and visual materials are meaningfully integrated, while dual coding theory suggests that information presented through both visual and verbal channels can strengthen cognitive processing and memory [7] [8]. In the context of depression education, these theories support the use of motion graphics to present psychological concepts in a clearer and more cognitively accessible manner. In addition, a structured learning environment can guide learners through a systematic learning process and provide opportunities for self-directed learning, assessment, and reflection.

Based on the literature critique, the problem addressed in this study is that undergraduate students need accessible and structured learning resources to improve their understanding of depression, while empirical evidence on the development and evaluation of motion graphics-enhanced learning environments for mental health education remains limited. Existing studies have contributed important knowledge about depression prevalence, risk factors, service utilization, and the potential of digital media. However, there remains a need for research that integrates motion graphics with instructional design principles and evaluates its effectiveness in improving students' understanding within a higher education context.

To address this gap, this study developed and evaluated a motion graphics-enhanced learning environment for improving undergraduate students' understanding of depression in a higher education context. The study was guided by the following research questions:

RQ1: What is the quality level of the developed motion graphics-enhanced learning environment for improving undergraduate students' understanding of depression?

RQ2: To what extent does the developed learning environment improve undergraduate students' understanding of depression after learning?

RQ3: What is the level of students' satisfaction with the motion graphics-enhanced learning environment?

2. OBJECTIVES OF THE STUDY

The objectives of this study were to:

1. develop and evaluate the quality of a motion graphics-enhanced learning environment for improving undergraduate students' understanding of depression;

2. compare undergraduate students' understanding of depression before and after learning through the developed motion graphics-enhanced learning environment; and

3. examine students' satisfaction with the motion graphics-enhanced learning environment.

2.1 Research Contributions

The contribution of this study is threefold. First, it provides a design-based example of integrating motion graphics into a structured digital learning environment for depression education. Second, it offers empirical evidence on the effectiveness of the developed learning environment in improving undergraduate students' understanding of depression. Third, it contributes to mental health literacy education by demonstrating how multimedia learning principles can be applied to communicate sensitive mental health content in an engaging, accessible, and learner-centered manner.

3. METHODOLOGY

3.1 Research Design

This study adopted a Research and Development (R&D) approach to systematically develop and evaluate a motion graphics-enhanced learning environment. The research procedure comprised two main phases: (1) the development of the learning environment and (2) the implementation and evaluation of the developed learning environment.

The learning environment was developed based on the ADDIE instructional design model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation.

During the implementation phase, a pre-experimental research design, specifically a one-group pretest-posttest design, was employed. This design enabled the comparison of undergraduate students' understanding of depression before and after engagement with the motion graphics-enhanced learning environment, as well as the

assessment of their satisfaction with the learning environment. The independent variable was the motion graphics-enhanced learning environment, while the dependent variables included students' understanding of depression and their satisfaction.

The implementation was carried out in a classroom setting during a scheduled learning session. However, the absence of a control group may limit the strength of causal interpretation and the generalizability of the findings.

3.2 Participants

The population comprised 271 undergraduate students enrolled in a program at a university in Southern Thailand during the second semester of the 2025 academic year. The required sample size was determined using the Krejcie and Morgan table [9], which indicated a minimum of 159 participants. To ensure sufficient representation, 160 students were included in the study.

A proportionate stratified random sampling technique was employed, with year of study (Years 1–4) serving as the basis for stratification. The sample size for each stratum was proportionally allocated according to the population distribution. Participants were then randomly selected within each stratum to ensure representation across academic levels.

3.3 Research Instruments

1. Motion Graphics-Enhanced Learning Environment

The learning environment was developed as an online platform integrating motion graphics and interactive learning activities. It included key components such as an introduction to depression, motion graphics content, pretest and posttest, a satisfaction questionnaire, and information on mental health support resources. The content covered essential topics, including the definition, causes, symptoms, severity levels, treatment approaches, and help-seeking channels related to depression.

The quality evaluation criteria for the motion graphics-enhanced learning environment were developed to reflect both instructional and multimedia design dimensions. Since the learning environment was designed not merely as a standalone media product but as an instructional environment for depression education, the criteria covered content structure, content presentation, language use, graphic design, audio and narration, typography, motion graphics, and practical application.

These criteria were considered significant because depression-related content requires accuracy, clarity, sensitivity, and accessibility for

undergraduate students. In addition, the integration of visual, verbal, and interactive elements needed to support learners' cognitive understanding rather than only attract attention. Therefore, the evaluation criteria were aligned with the ADDIE instructional design process, multimedia learning principles, and the intended learning outcome of improving students' understanding of depression.

2. Depression Understanding Test

A 15-item true–false test was developed to assess students' understanding of depression before

and after learning through the motion graphics–enhanced learning environment. The test items were constructed based on relevant theories, literature, and key content areas of depression, including definitions, symptoms, severity levels, treatment approaches, and help-seeking channels. Content validity was examined by three experts using the Index of Item–Objective Congruence (IOC), and only items that met the acceptable validity criteria were retained.

Table 1: Content Validity Index (IOC) of the Depression Understanding Test Items

Item No.	Item Description	E1	E2	E3	IOC	Interpretation
1	Depression affects emotional, cognitive, behavioral, and physical changes	+1	+1	+1	1.00	Appropriate
2	Depression occurs only among university students	+1	+1	+1	1.00	Appropriate
3	If left untreated, depression may develop into a depressive disorder	+1	+1	+1	1.00	Appropriate
4	Suicidal ideation is a severe symptom requiring immediate professional help	+1	+1	+1	1.00	Appropriate
5	Moderate depression begins to affect academic performance and daily life	+1	+1	+1	1.00	Appropriate
6	All individuals with depression must always be treated with medication	+1	+1	+1	1.00	Appropriate
7	A supportive environment and being listened to cannot help improve depression	+1	+1	+1	1.00	Appropriate
8	Depression cannot be prevented or treated	+1	+1	+1	1.00	Appropriate
9	The Mental Health Hotline (1323) is available 24 hours a day	+1	+1	+1	1.00	Appropriate
10	Severe depression should be treated with psychotherapy combined with medication	0	+1	+1	0.67	Appropriate
11	Daily functioning ability indicates the severity level of depression	0	+1	+1	0.67	Appropriate
12	Insomnia and fatigue are common symptoms of depression	0	+1	+1	0.67	Appropriate
13	Frequent crying is commonly observed in individuals with depression	0	+1	+1	0.67	Appropriate
14	Individuals with depression often feel worthless, hopeless, and pessimistic	0	+1	+1	0.67	Appropriate
15	Sadness or irritability is a primary symptom of depression	0	+1	+1	0.67	Appropriate

3. Satisfaction Questionnaire

A five-point Likert-scale questionnaire was developed to evaluate students' satisfaction with the motion graphics–enhanced learning environment. The instrument consisted of three

dimensions: content of motion graphics, media design, and usability of the learning environment. The questionnaire was validated by experts to ensure content appropriateness prior to data collection.

Table 2: Content Validity Index (IOC) of the Satisfaction Questionnaire on the Motion Graphics–Enhanced Learning Environment

Dimension	Item Description	E1	E 2	E 3	IOC	Interpretation
Content of Motion Graphics	The content is easy to understand and not complex	+1	+1	+1	1.00	Appropriate
	The content is logically consistent and well-organized	+1	+1	+1	1.00	Appropriate
	The content is appropriate	+1	+1	+1	1.00	Appropriate
	The language used is appropriate	+1	+1	+1	1.00	Appropriate
Motion Graphic Design	The motion graphics are visually engaging	+1	+1	+1	1.00	Appropriate
	The font size is readable	+1	+1	+1	1.00	Appropriate
	The font style is clear	+1	+1	+1	1.00	Appropriate
	The background sound is appropriate	+1	+1	+1	1.00	Appropriate
	The narration is clear	+1	+1	+1	1.00	Appropriate
	The animation is clear and appropriate	+1	+1	+1	1.00	Appropriate
Application in Learning Environment	The motion graphics–enhanced learning environment enhances understanding of depression	+1	+1	+1	1.00	Appropriate
	Students can apply the acquired knowledge in daily life	+1	+1	+1	1.00	Appropriate
	Students can share the acquired knowledge with others	+1	+1	+1	1.00	Appropriate

3.4 Data Collection

Data collection was conducted with undergraduate students at a university in Southern Thailand during the second semester of the 2025 academic year. Prior to data collection, participants were informed of the research objectives, procedures, voluntary participation, confidentiality, and their right to withdraw from the study at any time. Informed consent was obtained before participation.

Participants first completed the pretest to assess their baseline understanding of depression. They then engaged with the motion graphics–enhanced learning environment developed for this study. After completing the learning activities, participants completed the posttest to assess their understanding of depression following the intervention. Subsequently, they responded to the satisfaction questionnaire to evaluate their perceptions of the learning environment.

The data obtained from the pretest, posttest, and satisfaction questionnaire were systematically analyzed using appropriate statistical methods.

3.5 Data Analysis

Data were analyzed in accordance with the research objectives using both descriptive and inferential statistics. Descriptive statistics, including mean and standard deviation, were used to

summarize the quality evaluation of the developed learning environment, students' satisfaction with the learning environment, and the overall trends of the data.

To examine students' understanding of depression, pretest and posttest scores were analyzed using a paired-samples t-test. Prior to conducting the analysis, the assumptions of the test, including the normality of score differences, were considered. The paired-samples t-test was employed to determine whether there was a statistically significant difference between students' pretest and posttest scores after learning through the motion graphics–enhanced learning environment. The level of statistical significance was set at .01.

Students' satisfaction with the learning environment was analyzed using descriptive statistics to determine the overall level of satisfaction as well as satisfaction across different dimensions, including content, media design, and application in the learning environment. The results were interpreted based on predefined criteria for mean score ranges.

All statistical analyses were conducted using appropriate statistical procedures to ensure the accuracy and reliability of the findings.

3.6 Ethical Considerations

This study was reviewed and approved by the Human Research Ethics Committee for Humanities, Social Sciences and Education, Prince of Songkla University, Pattani Campus (REC No. psu.pn.2-156/68). Prior to participation, all participants were informed about the purpose of the study, research procedures, voluntary participation, potential risks and benefits, confidentiality, and their right to withdraw from the study at any time without penalty. Informed consent was obtained from all participants before data collection. All collected data were kept confidential and used solely for research purposes.

4. RESULTS

4.1 Quality of the Developed Learning Environment

The developed motion graphics-enhanced learning environment was evaluated by experts in the fields of educational technology and mental health. The results indicated that the overall quality of the learning environment was at a very high level ($M = 4.55$, $S.D. = 0.59$), suggesting that its content, design, presentation, and application were appropriate for enhancing undergraduate students' understanding of depression.

The expert evaluation focused on dimensions directly related to the instructional purpose of the learning environment. Content structure and content presentation were assessed to

determine whether depression-related information was accurate, logically sequenced, and appropriate for undergraduate students. Language use, graphic design, audio and narration, typography, and animation were evaluated because these elements influence the clarity, accessibility, and cognitive processing of multimedia learning materials. The application dimension was included to examine whether the developed media could encourage further learning, consultation, and practical use of depression-related knowledge. These criteria were therefore essential for determining whether the learning environment could function effectively as an educational tool for mental health literacy rather than merely as an attractive digital media product.

As shown in Table 3, the developed learning environment received high to very high ratings across all evaluation dimensions. The highest-rated aspects included content accuracy, narration matching the content and graphics, tone and pacing of narration, and engaging audio elements. These findings suggest that the integration of accurate content, clear presentation, appropriate language, visual design, narration, typography, and motion graphics contributed to the overall quality of the learning environment. The results also indicate that the learning environment was suitable for presenting sensitive mental health content in a clear, engaging, and educationally meaningful manner.

Table 3: Expert Evaluation of the Motion Graphics-Enhanced Learning Environment

Dimension	Item Description	E1	E2	E3	Mean (M)	S.D.	Interpretation
Content Structure	The content aligns with the objectives	5	4	5	4.67	0.58	Highest
	The content structure is clear and logically organized	5	4	5	4.67	0.58	Highest
	The content is accurate	5	5	5	5.00	0.00	Highest
	The amount of content is appropriate	5	4	3	4.00	1.00	High
	The content is appropriate for the target group	5	4	4	4.33	0.58	High
Content Presentation	The presentation of content is clear	5	4	4	4.33	0.58	High
	The storyline is engaging	5	3	4	4.00	1.00	High
	The sequence of content is easy to understand	5	4	4	4.33	0.58	High
	The storyline is clear	5	4	4	4.33	0.58	High
	The presentation is clear	5	4	4	4.33	0.58	High
	The visuals are consistent with the content	5	3	5	4.33	1.15	High

Dimension	Item Description	E1	E2	E3	Mean (M)	S.D.	Interpretation
Language Use	The language is correct	5	4	5	4.67	0.58	Highest
	The language is appropriate for the target group	5	4	5	4.67	0.58	Highest
	The language is clear and understandable	5	4	5	4.67	0.58	Highest
Graphics Design	Graphics are clear, meaningful, and relevant	5	3	5	4.33	1.15	High
	Graphics are visually appealing	5	4	5	4.67	0.58	Highest
	The size of graphics is appropriate	5	4	5	4.67	0.58	Highest
	The layout of graphics is appropriate	5	4	5	4.67	0.58	Highest
Audio and Narration	The narration is clear	5	4	5	4.67	0.58	Highest
	The narration matches the content and graphics	5	5	5	5.00	0.00	Highest
	The volume of narration and audio is appropriate	5	4	5	4.67	0.58	Highest
	The tone and pacing of narration are appropriate	5	5	5	5.00	0.00	Highest
	The narration and audio are engaging	5	5	5	5.00	0.00	Highest
Typography	Font size is appropriate and readable	5	4	5	4.67	0.58	Highest
	Font style is clear and visually appealing	5	4	5	4.67	0.58	Highest
	Font color is appropriate	5	4	4	4.33	0.58	High
	Text layout is appropriate	5	4	5	4.67	0.58	Highest
Motion Graphics	Animation aligns with the content	5	4	5	4.67	0.58	Highest
	Animation size is appropriate and clear	5	4	5	4.67	0.58	Highest
	Animation continuity is smooth	5	4	4	4.33	0.58	High
	Animation speed is appropriate	5	4	4	4.33	0.58	High
Application	The media encourages further learning or consultation	5	3	4	4.00	1.00	High
	The media enhances understanding and can be practically applied	5	4	5	4.67	0.58	Highest

4.2 Comparison of Students' Understanding

A paired-samples t-test was conducted to compare undergraduate students' understanding of depression before and after learning through the motion graphics-enhanced learning environment. The results revealed that the mean posttest score (M = 13.03, S.D. = 1.37) was higher than the mean pretest score (M = 9.63, S.D. = 1.67). The difference

between the pretest and posttest scores was statistically significant at the .01 level ($t = 32.45, p < .001$).

Table 4: Comparison of Students' Understanding of Depression Before and After Learning

Comparison	Pretest M (S.D.)	Posttest M (S.D.)	t	p
Understanding of depression	9.63 (1.67)	13.03 (1.37)	32.45	< .001

These findings indicate that the developed learning environment was effective in enhancing students' understanding of depression. The increase in posttest scores suggests that the structured presentation of depression-related content, together with the use of motion graphics, helped students better understand key concepts such as symptoms, severity levels, treatment approaches, and help-seeking channels. This result directly responds to the research problem concerning the need for accessible and systematic learning resources to improve undergraduate students' understanding of depression.

4.3 Students' Satisfaction

The results indicated that students' overall satisfaction with the motion graphics-enhanced learning environment was at the highest level ($M = 4.93$, $S.D. = 0.30$). This finding suggests that students had highly positive perceptions of the developed learning environment.

When considering specific dimensions, students reported the highest level of satisfaction across all aspects, including the content of motion graphics, motion graphic design, and application in

the learning environment. The content dimension received the highest mean score ($M = 4.95$, $S.D. = 0.23$), followed by application in the learning environment ($M = 4.91$, $S.D. = 0.34$) and motion graphic design ($M = 4.88$, $S.D. = 0.34$). These results indicate that students perceived the learning environment as understandable, well-organized, visually engaging, and useful for applying and sharing depression-related knowledge.

The high level of satisfaction also supports the suitability of using motion graphics within a structured learning environment for mental health education. Since depression is a sensitive and complex topic, students' positive perceptions toward content clarity, media design, and practical application suggest that the developed environment was able to present depression-related information in an accessible and learner-friendly manner. This finding reinforces the contribution of the study by demonstrating that the integration of motion graphics, organized content, and learning support features can promote both understanding and positive learning experiences among undergraduate students.

Table 5: Students' Satisfaction with the Motion Graphics-Enhanced Learning Environment

Dimension	Item	Mean (M)	S.D.	Interpretation
Content	The content is easy to understand and not complex	4.97	0.18	Highest
	The content is consistent and well-organized	4.93	0.31	Highest
	The content is appropriate	4.97	0.18	Highest
	The language used is appropriate	4.94	0.27	Highest
	Overall (Content)	4.95	0.23	Highest
Motion Graphic Design	The motion graphics are visually engaging	4.84	0.51	Highest
	The font size is readable	4.91	0.29	Highest
	The font style is clear	4.92	0.27	Highest
	The background sound is appropriate	4.84	0.40	Highest
	The narration is clear	4.89	0.33	Highest
	The animation is clear and appropriate	4.87	0.34	Highest
	Overall (Design)	4.88	0.34	Highest
Application in Learning Environment	The learning environment enhances understanding of depression	4.93	0.33	Highest
	Students can apply the knowledge in daily life	4.93	0.29	Highest

	Students can share knowledge with others	4.93	0.41	Highest
	Overall (Application)	4.91	0.34	Highest
Overall	Overall Satisfaction	4.93	0.30	Highest

The findings of this study indicate that integrating motion graphics within a structured learning environment can significantly enhance undergraduate students' understanding of depression. This result directly responds to the research problem identified in this study, namely the need for accessible and systematic learning resources that can help students understand depression-related concepts, including symptoms, severity levels, treatment approaches, and help-seeking channels. The significant increase in posttest scores suggests that the developed learning environment was effective in supporting students' cognitive understanding of depression.

This finding can be explained by the design of the learning environment, which presented depression-related content in a structured sequence and used motion graphics to simplify complex psychological concepts. Rather than presenting information through text alone, the learning environment combined visual elements, narration, animation, and organized learning activities. This design is consistent with multimedia learning theory, which explains that the integration of visual and verbal information can support cognitive processing and improve learning outcomes [7]. It is also supported by dual coding theory, which suggests that information presented through both visual and verbal channels can enhance memory and comprehension [8].

The findings are also consistent with previous studies showing that motion graphics and animated media can support health communication and improve learners' understanding of health-related content. Previous research has demonstrated the effectiveness of motion graphics in presenting health information in a clear and engaging format [4] [5]. In the context of depression education, the findings are consistent with previous research showing that motion-graphic media could improve higher education students' understanding of depression [6]. However, the present study extends previous work by embedding motion graphics within a structured learning environment rather than using motion graphics as standalone media. This integration provides a more systematic learning process through pre-learning assessment, organized content presentation, post-learning assessment, satisfaction evaluation, and access to mental health support information.

The expert evaluation results further support the quality and appropriateness of the developed learning environment. The evaluation criteria covered content structure, content presentation, language use, graphic design, audio and narration, typography, motion graphics, and application. These criteria were important because the learning environment was designed to communicate sensitive mental health content that requires accuracy, clarity, and accessibility. The very high level of quality indicates that the developed learning environment met both instructional and multimedia design requirements. This suggests that the effectiveness of the learning environment was not due only to the attractiveness of motion graphics, but also to the systematic organization of content, appropriate media design, and alignment with the intended learning outcome.

The high level of students' satisfaction also provides additional evidence that the developed learning environment was appropriate for undergraduate learners. Students rated the content, motion graphic design, and application in the learning environment at the highest level. These results suggest that students perceived the learning environment as easy to understand, visually engaging, and useful for applying or sharing depression-related knowledge. This is important because positive learner perceptions can support engagement and acceptance of digital learning resources, particularly when the topic involves sensitive psychological issues such as depression.

When considered together, the findings suggest that a motion graphics-enhanced learning environment can contribute to mental health literacy education by transforming depression-related knowledge into a more accessible and learner-centered format. The study provides empirical evidence that the combination of structured instructional design and motion graphics can improve students' understanding of depression and create positive learning experiences. Therefore, this work contributes not only to the use of digital media in education but also to the development of instructional approaches for communicating mental health knowledge in higher education contexts.

5. CONCLUSION

This study concluded that a motion graphics-enhanced learning environment can

effectively improve undergraduate students' understanding of depression. The study was conducted in response to the need for accessible, systematic, and engaging learning resources that can help students understand depression-related concepts, including symptoms, severity levels, treatment approaches, and help-seeking channels. By integrating motion graphics into a structured learning environment, the study demonstrated how digital media and instructional design can be combined to support mental health education in higher education contexts.

The findings showed that the developed learning environment was rated at a very high level of quality by experts. This indicates that the content structure, presentation, language, visual design, narration, typography, motion graphics, and application were appropriate for communicating depression-related knowledge to undergraduate students. The significant improvement in students' posttest scores further confirmed that the learning environment supported students' cognitive understanding of depression. In addition, the highest level of student satisfaction suggests that learners perceived the environment as understandable, engaging, and useful for applying or sharing depression-related knowledge.

The contribution of this study lies in providing empirical evidence that motion graphics, when embedded within a structured learning environment, can enhance students' understanding of depression and support positive learning experiences. Unlike studies that examine motion graphics as standalone media, this study emphasizes the value of combining multimedia elements with an organized learning sequence, assessment, and support information. Therefore, the findings contribute to digital learning design and mental health literacy education by demonstrating a practical approach for presenting sensitive psychological content in an accessible and learner-centered format.

However, some limitations should be acknowledged. The study employed a one-group pretest–posttest design without a control group; therefore, causal interpretation should be made with caution. In addition, the participants were undergraduate students from a single university in Southern Thailand, which may limit the generalizability of the findings to other institutions, regions, or student populations. The study also focused primarily on cognitive understanding and satisfaction, while other outcomes such as long-term retention, help-seeking intention, behavioral

change, and emotional engagement were not examined.

Future research should address these open research issues by employing experimental or quasi-experimental designs with comparison groups, examining long-term knowledge retention, and investigating whether motion graphics–enhanced learning environments can influence students' attitudes, help-seeking intentions, or mental health-related behaviors. Further studies should also test the learning environment with more diverse student groups and compare motion graphics with other forms of digital learning media. These directions would strengthen the evidence base for using multimedia learning environments to promote mental health literacy in higher education.

6. AUTHOR CONTRIBUTIONS

Veerayut Boonpit was responsible for the conceptualization of the study, research design, development of the learning environment, data collection, data analysis, and preparation of the manuscript. Ophat Kaosaiyaporn contributed to research supervision, methodological design, instructional design consultation, and critical review of the manuscript. Sakkarin Chonpracha contributed to academic supervision, scholarly guidance, validation of the study, and refinement of the manuscript. Jirawat Tansakul contributed to research methodology, measurement and evaluation consultation, validation processes, and manuscript review. All authors critically reviewed and approved the final version of the manuscript prior to submission.

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