

LINE OA MEDIA DEVELOPMENT USING GAME-BASED LEARNING FOR VOCATIONAL LAW SKILLS

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ABSTRACT

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Due to the features of a LINE Official Account, which enable the gamification of learning and enhance student engagement, this research aimed to: (1) examine the commercial law competencies of vocational students as entrepreneurs, (2) develop and evaluate the quality of instructional media via LINE Official Account using game-based learning for vocational law skills as entrepreneurs, (3) compare the commercial law competence of vocational students before and after learning with the developed instructional media, and (4) assess students' satisfaction with the developed instructional media. Data were collected from a sample of 40 vocational students majoring in Business Computing, selected through cluster random sampling during the first semester of the 2024 academic year. The research findings revealed that commercial law competence in entrepreneurship comprises: (1) knowledge of commercial law, (2) skills in applying commercial law, and (3) attributes for applying commercial law in entrepreneurial contexts. The instructional media were developed based on these findings, incorporating game-based learning via a LINE Official Account. The media included basic, intermediate, and advanced content presented as animated videos and games, accompanied by an AI assistant named "Brain Lump." Expert evaluations revealed that the content quality was rated at a very good level ($\bar{x} = 5.00$, S.D. = 0.00), and the quality of the presentation media was also rated at a very good level ($\bar{x} = 4.94$, S.D. = 0.08). A comparison of students' competence before and after using the developed instructional media demonstrated a statistically significant improvement at the .05 level (t-test = 13.88). Furthermore, the satisfaction evaluation indicated that the students rated the instructional media at the highest level ($\bar{x} = 4.54$, S.D. = 0.53). Therefore, the developed instructional media are practical and applicable for enhancing vocational students' competence in commercial law as entrepreneurs.

Keywords: LINE Official Account; game-based learning; competence; commercial law; entrepreneurs; vocational students

1. INTRODUCTION

In recent years, the number of youth entering entrepreneurship has significantly increased due to their ability to access digital technologies, especially following the COVID-19 pandemic. This has acted as a catalyst for the rapid growth of the digital business ecosystem. Additionally, vocational students aged 15–17, part of Generation Z, have grown up with technology and the internet as an integral part of their daily lives. They possess the skills necessary to use technology to access information, learn essential business skills, and create

business opportunities through digital platforms and online presence. This has enabled them to build their personal brands both during their studies and after graduation. Such behavior aligns with the 2021–2030 strategic plan of the Southeast Asian Ministers of Education Organization (SEAMEO) (2021), as well as Sustainable Development Goal 4.4 and SEAMEO Goal 7.1. These goals aim to support and increase the number of youth and adults with relevant skills, including technical and vocational skills, to enhance employability, secure decent work, and promote entrepreneurship by 2030. This approach is also supported by the report *Entrepreneurial Learning for TVET Institutions: A Practical Guide* from the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Lindner, 2020), as well as the *Youth Co* initiative by the United Nations Development Programme (UNDP) and the Citi Foundation (2017), which was established to promote the potential of youth in the Asia-Pacific region through leadership, social innovation, and entrepreneurship, in line with the Sustainable Development Goals (SDGs). Furthermore, the *OECD's* promotion of entrepreneurial education in schools continues to encourage these endeavors (Lackéus, 2015).

Thailand established national strategic priorities for the years 2018–2030, focusing on the development and enhancement of human resource capabilities. The first key priority is the lifelong development of individuals, particularly within the working-age population, through the advancement of learning systems and knowledge facilitation. This strategy aims to enhance knowledge, skilled labor, specialized expertise, and entrepreneurship in order to continuously elevate the skills, capabilities, and competencies of the workforce, in line with individual abilities and the demands of the labor market. By 2030, Thailand aims to prioritize enabling new entrepreneurs to integrate more effectively into the economic system, increase investment, and improve competitiveness both domestically and internationally. It is essential to cultivate and develop Thai entrepreneurs who play a pivotal role in driving economic growth. The strength of these entrepreneurs will contribute to the country's ability to compete on the global stage. New-generation entrepreneurs must be equipped with future-ready skills, including the right attitude, ability, and knowledge to navigate increasingly intense competition resulting from rapid changes in the global landscape. Therefore, in the current context of economic and social development, "people" are at the core of driving progress. It is critical to create and develop Thai entrepreneurs into "new-generation entrepreneurs" who are well-equipped to leverage technology and innovation to propel their businesses forward (Office of the Secretary of the National Strategy Committee, 2018).

The Office of the Vocational Education Commission (OVEC) in Thailand has set a strategic mission to manage vocational education and professional training in a way that ensures high-quality standards, broadens access to vocational education, and promotes equity. As outlined in the National Vocational Qualifications Framework (NVQF) 2019, OVEC has established clear standards for vocational qualifications and educational benchmarks, organized by qualification levels and fields of study. This framework supports the development of Competency-Based Curricula (CBC) for vocational education, a model driven by industry needs. The CBC model is based on actual job performance standards, allowing the competencies demonstrated by professionals in their respective fields to be translated into educational programs. The aim is for graduates to acquire competencies directly aligned with the demands of the workforce, enabling them to immediately enter the labor market as qualified practitioners or entrepreneurs. This competency-based approach is a central feature of vocational education management under the Vocational Education Act of 2008. It aligns with national development plans, including the National Economic and Social Development Plan, the National Education Plan, and the National Education Act of 1999. By 2024, it is expected that the quality of graduates will reflect the unique characteristics of vocational curricula, the national context, and global trends. The required learning outcomes are defined in four key areas: 1) moral and ethical values, social norms, desirable personal traits, and character; 2) knowledge; 3) practical skills; and 4) the ability to apply knowledge and skills responsibly in real-world contexts ("National Vocational Qualifications Framework B.E. 2567," 2024).

In the role of a teacher for a vocational-level Commercial Law course—a component of the professional competency curriculum under the foundational competencies category—the researchers designed the course to equip students with both theoretical knowledge of commercial law principles and practical skills in drafting relevant legal documents. These skills are essential for enhancing professional performance across various fields. The course aims to prepare vocational students to establish their businesses by effectively applying legal principles in ways that are beneficial and socially responsible. The study of vocational students' competencies in commercial law as aspiring entrepreneurs serves as a critical foundation for fostering legal skills necessary for entrepreneurial readiness. This preparation promotes lawful, safe business operations while minimizing future legal risks. It also challenges students to develop cross-disciplinary skills. In their review of legal education for entrepreneurial thinking, Platts-Mills and Wapples (2023) emphasize raising awareness of legal issues impacting entrepreneurs. They advocate for teaching methods that encourage recognizing new opportunities and building confidence to act upon them, ultimately fostering entrepreneurial instincts and skills. Similarly, Kuratko (2011) highlights that effective entrepreneurial education demonstrates how to

behave entrepreneurially, empowering learners to succeed. Kuratko (2011) emphasizes the challenge for entrepreneurship educators in designing impactful learning opportunities. Entrepreneurship educators must also adopt innovative mindsets, embrace creative vision, calculated risk-taking, and strong leadership qualities essential for 21st-century entrepreneurship. Transforming classrooms into innovation-friendly environments involves addressing challenges associated with leadership in entrepreneurial education.

Since game-based learning is an instructional technique that stimulates learners' interest in the learning process, it encourages active participation within a challenging and enjoyable environment. The games used as learning tools are closely related to or incorporate the content that needs to be learned, and they are in a digital media format, which learners can easily access via computers or mobile devices. Furthermore, game-based learning motivates learners to utilize their potential and integrate relevant knowledge to achieve the game's goals. It encourages learners to collaborate with others when they need help or assistance and fosters persistence in overcoming obstacles in order to complete the game or achieve its rewards. It helps learners develop achievement motivation and a sense of attachment to the learning process. It enables learners to manage their emotions and respond appropriately to different situations. Additionally, it allows learners to practice critical thinking, integration, and strategy development for success, as well as communication skills, teamwork, responsibility, and respect for rules and outcomes. At the same time, learners acquire essential content knowledge and develop various skills embedded within the game (Professional and Organizational Development Network of Thailand Higher Education, 2024).

Globally, significant emphasis is placed on investing in information and communication technology (ICT) as a tool for advancing economic, social, and educational development. LINE Official Account (OA) for businesses enables companies to build a follower base, communicate, and distribute sales and marketing information, including special promotions, directly to customers. With versatile features such as automated greetings, chat responses, coupons, loyalty cards, one-on-one chats, broadcasts to all followers, and targeted group broadcasts, LINE OA enhances customer experiences and supports efficient business management. Building on this functionality, educational innovation has emerged to integrate LINE OA's features into instructional design to foster student learning skills. This approach allows students to review lessons and practice skills according to course requirements. For instance, adapting LINE OA's online sales features to align with course content offers new teaching methods (Suropan, 2021). The researcher identifies the challenge of developing instructional media via LINE OA using game-based learning to enhance commercial law competencies among vocational students. A review of recent research in the field of educational communications and technology from the Faculty of Industrial Education and Technology at King Mongkut's University of Technology, Thonburi, reveals substantial advancements. International studies published in the past two years include: Napaporn et al. (2023), focusing on *The Cloud-powered hybrid learning process to enhance digital natives' analytical reading skills*; Waiwingrob et al. (2023), exploring *Active learning extracurricular activities using digital content to promote the awareness of Thai arts and culture for undergraduate students*; Kaewsomnues et al. (2023), examining *The development of an E-exhibition in conjunction with a game-based learning communication activity*; Thamwipat et al. (2024a), investigating *A synthesis of research studies on public relations multimedia utilization within an educational institute during the COVID-19 pandemic* and Thamwipat et al. (2024b), exploring *The development of digital content in the metaverse combined with participatory communication and learning with religious leaders to enhance students' perception of the community mosque*; Thamwipat et al. (2024c), addressing *Development and assessment of review clips by disabled students for a teenage soul healing program on the TikTok platform*. Despite the diversity of topics explored, none have yet applied LINE OA with game-based learning as an instructional medium with LINE OA's features, which can gamify learning and engage students. The researcher aims to develop game-based instructional media via LINE OA to enhance vocational students' commercial law competencies for entrepreneurial success.

2. MATERIALS AND METHODS

2.1 Objectives of the study

This research aimed to achieve the following four objectives:

1. To examine the commercial law competencies of vocational students as entrepreneurs.
2. To develop and evaluate the quality of instructional media via LINE OA using game-based learning to enhance commercial law competencies of vocational students as entrepreneurs.
3. To compare the commercial law competencies of vocational students as entrepreneurs before and after using game-based instructional media via LINE OA.
4. To assess students' satisfaction with the game-based instructional media via LINE OA for enhancing their commercial law competencies as entrepreneurs.

2.2 Expected benefits

This research was expected to yield three key benefits:

1. It provided a self-directed learning resource to enhance vocational students' competencies in commercial law as entrepreneurs.
2. It offered a practical and contextually appropriate teaching approach for vocational students, aligning with the educational context of Thailand.
3. It increased access to instructional materials on commercial law for entrepreneurial education, particularly in institutions under the OVEC that face shortages of teaching resources and qualified instructors in law-related courses.

2.3 Scope of the study

This research encompassed the following areas:

1. Content scope: The study focused on the development of game-based instructional media via LINE OA to enhance vocational students' commercial law competencies as entrepreneurs. The content was divided into three levels: 1) Basic level, which covered topics from the commercial law course under the Vocational Certificate curriculum of the Office of Vocational Education Commission, Ministry of Education, focusing on competencies related to drafting commercial law documents; 2) Intermediate level, which addressed legal knowledge pertinent to modern entrepreneurship, and 3) Advanced level, which focused on legal responsibilities essential for modern entrepreneurs.
2. Population: The population for this study comprised 120 students enrolled in the Commercial Law course during the first semester of the 2024 academic year at Bangkok College of Business Administration and Tourism, under the OVEC.
3. Sample group: The sample group consisted of 40 second-year vocational certificate students majoring in Business Computer, selected through cluster random sampling with a confidence level of 90% (Kanjana-vassee et al., 2016). Data collection was conducted during the first semester of the 2024 academic year at Bangkok College of Business Administration and Tourism.

2.4 Research instruments

This study utilized the following four research instruments:

1. Game-based instructional media on LINE OA designed to enhance vocational students' competence in commercial law related to entrepreneurship.
2. Lesson plans: A six-week instructional plan was tailored for implementing the game-based media.
3. Content and media quality evaluation forms used to assess the quality of the game-based instructional media on LINE OA, focusing on both content and presentation. Evaluations were conducted by experts in the relevant fields.
4. Commercial law competence test: A four-option multiple-choice test was developed to measure vocational students' competence in commercial law related to entrepreneurship.
5. Student satisfaction survey: A five-point Likert scale questionnaire was developed to evaluate students' satisfaction with the game-based instructional media delivered via LINE OA.

All research tools underwent an evaluation of their IOC (Item-Objective Congruence) by experts in measurement and assessment, yielding IOC values ranging from 0.67 to 1.00, which were considered acceptable. Additionally, the research was approved by the Research Ethics and Compliance Office, Research, Innovation and Partnerships at King Mongkut's University of Technology Thonburi (Certificate Number: KMUTT-IRB-COA-2024-043) before data collection from the sample group commenced.

2.5 Data analysis

This study utilized statistical methods to analyze assessment results and evaluation forms. The statistical tools employed include the mean, standard deviation, and t-test (Srisa-ard, 2011). The interpretation of the mean scores is as follows:

4.51–5.00	means	Very good / the Highest
3.51–4.50	means	Good / High
2.51–3.50	means	Fair / Moderate
1.51–2.50	means	Under Average / Relatively Low
1.00–1.50	means	Poor / Low

3. RESULTS AND DISCUSSION

The research findings in this study consist of four main parts. The first part concerns examining the commercial law competencies of vocational students as entrepreneurs. The second part develops and evaluates

the quality of instructional media via LINE OA using game-based learning to enhance commercial law competencies of vocational students as entrepreneurs. The third part compares the commercial law competencies of vocational students as entrepreneurs before and after using game-based instructional media via LINE OA. Finally, the fourth part assesses students' satisfaction with the game-based instructional media via LINE OA for enhancing their commercial law competencies as entrepreneurs.

3.1 Findings on commercial law competence as entrepreneurs among vocational students

Table 1: Factors of commercial law competence as entrepreneurs

Factors of competence		Findings on the factors of commercial law competence as entrepreneurs
McClelland (1973); Boyatzis (1982)	Parry (1996)	
Knowledge	Knowledge	Knowledge of commercial law
Skills	Skills	Skills in applying commercial law
Traits		
Self-concept	Attributes	Attributes of applying commercial law in entrepreneurship
Motives		

Based on Table 1, the study identifies the components of commercial law competence in entrepreneurs for vocational students. The findings align with the competency models of McClelland (1973) and Boyatzis (1982), which categorize competencies into five factors. Parry's (1996) perspective consolidates the last three factors into a single category, referred to as "attributes." Integrating these perspectives with the competencies required for Commercial Law courses in the vocational certificate curriculum, the study delineates three key factors of commercial law competence for vocational students: 1) Knowledge of commercial law, 2) Skills in applying commercial law, and 3) Attributes for applying commercial law as entrepreneurs.

These three factors are embedded into the content of commercial law education for vocational students, structured across three levels: 1) Basic level, which is focused on the fundamentals of commercial law and competencies related to preparing documents following the vocational certificate curriculum by the OVEC, Ministry of Education; 2) Intermediate level, which emphasizes legal knowledge for modern entrepreneurs; and 3) Advanced level, which covers legal responsibilities critical for modern entrepreneurs.

Following this analysis, the study designed and developed instructional media via the LINE OA platform, employing game-based learning to enhance commercial law competence in entrepreneurship. The development process utilized the ADDIE Model, comprising five stages (Kurt, 2018; Rizal et al., 2021; Salas-Rueda et al., 2020), as shown in Table 2.

Table 2: Media analysis and design process using the ADDIE model

No.	Stage	Teaching media via LINE OA using games as a base
1	Analysis	1.1 The competence of the commercial law course in the vocational certificate curriculum, OVEC, Ministry of Education. 1.2 A group of Thai vocational students at vocational certificate level. 1.3 The commercial law competence for entrepreneurship among Thai vocational students, in accordance with the criteria for vocational education qualifications at the vocational certificate level.
2	Design	Design based on the concept of digital learning companion (Seibert et al., 2020; Tran et al., 2024) virtual learning companion (Schlimbach et al., 2024)
3	Development	The system was called "Brain Lump" on the LINE OA application consisting of 1) Course content and 2) Chatbot system
4	Implementation	4.1 Three law and three educational technology experts were selected by purposive sampling based on their occupation, education, or experience to assess the results of the index of consistency (IOC) between 0.67–1.00 (Rovinelli & Hambleton, 1976). 4.2 A Human Ethics Committee assessed the study. 4.3 Twenty second-year certificate students in Foreign Languages who studied Commercial Law in the previous semester were tried out for two weeks.
5	Evaluation	After analyzing and refining the instructional media, the study was conducted with the sample group during the first semester of the 2024 academic year. The research included pre- and post-assessments of competence using the instructional media, as well as an evaluation of students' satisfaction with the media.

3.2 Results of developing game-based instructional media via LINE OA to enhance vocational students' competence in commercial law as entrepreneurs

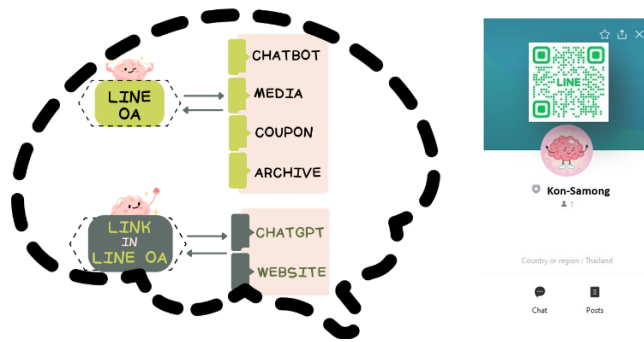


Figure 1: The operational system of the LINE OA instructional media, "Brain Lump"

As shown in Figure 1, the operational system of the LINE OA instructional media, "Brain Lump," consists of two main components:

1. Core System of the LINE OA: Teachers developed a chatbot system for question-and-answer interactions and organized instructional media into three content levels, accessible through system functions linked to external platforms such as Edpuzzle, Vonder Go, and others. Activities, such as games offering coupon rewards, notifications, and additional information, were integrated into the system's database (see Figure 2).
2. Supplementary System: Teachers created a repository of content to address inquiries on commercial law in entrepreneurship using OpenAI's ChatGPT. Additionally, they provided external website links that supported the development of vocational students' competence in commercial law for entrepreneurship (see Figure 2).

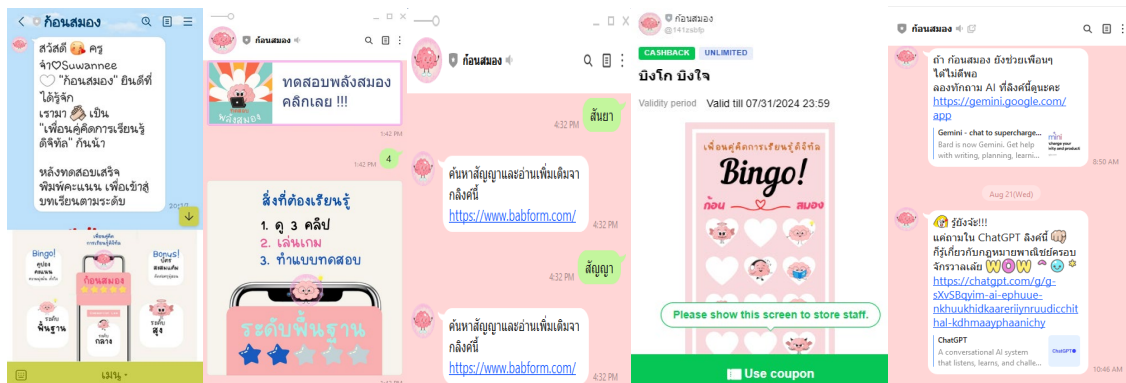


Figure 2: The standardized three-level content menu, chatbot-based Q&A system, coupon activity games, repository for commercial law queries in entrepreneurship using ChatGPT, and links to external supplementary websites

As shown in Figure 3, the course content is structured into three learning levels: 1) Basic, 2) Intermediate, and 3) Advanced. Each level includes diverse game instructional materials, as follows:

1. Videos developed for competence in commercial law for entrepreneurship: The videos cover three aspects of competence: 1) Knowledge of commercial law, 2) Skills in applying commercial law, and 3) Attributes for applying commercial law in entrepreneurship. These videos are integrated with Edpuzzle, enabling students to engage with educational video games and exercises simultaneously (see Figure 4).
2. Game-based quizzes: The quizzes are designed as interactive games linked to Vonder Go, allowing students to review the material through competitive game formats (see Figure 4).

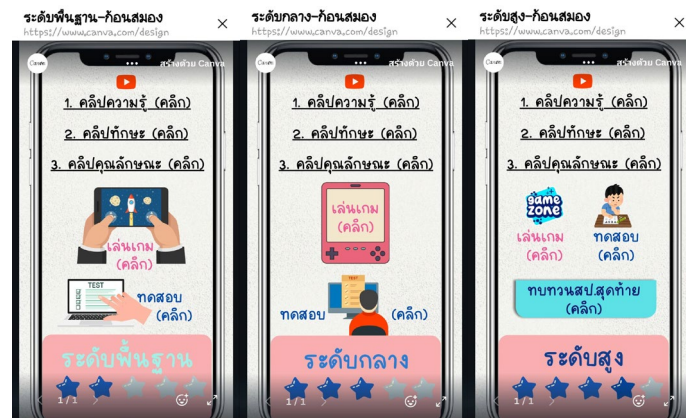


Figure 3: The course content categorized by three learning levels

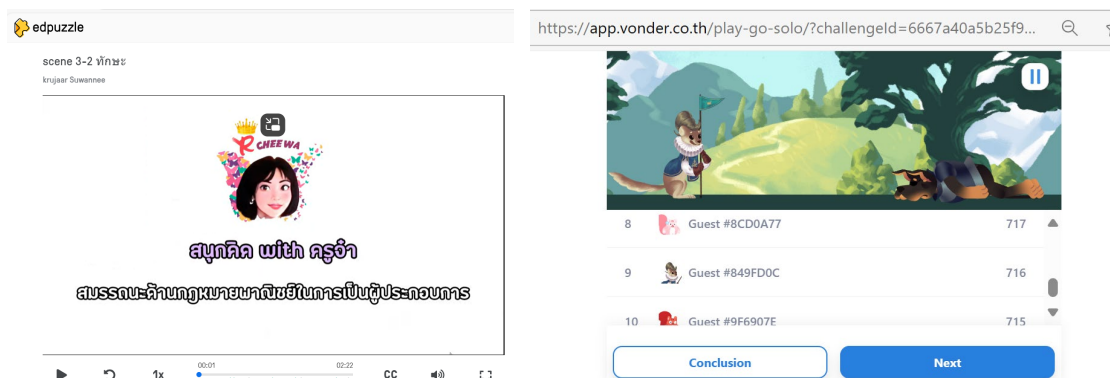


Figure 4: Educational video games and exercises on Edpuzzle, and quiz-based games on Vonder Go

Game-based instructional media via LINE OA for enhancing vocational students' competence in commercial law for entrepreneurship. This instructional media offers a variety of self-paced learning resources tailored to individual students' learning rhythms. It emphasizes game-based learning formats suitable for the students' developmental stage. The media allows students to learn anytime, anywhere, with the support of an AI companion named "Brain Lump," serving as a digital learning assistant outside the classroom through the LINE OA application. Additionally, teachers are available to facilitate learning both in and outside the classroom, offering guidance, consultations, and a connection to their personal LINE accounts for direct support.

The game-based instructional media was integrated into the learning plan for the Commercial Law course, spanning six weeks (weeks 11–16). This period followed the first ten weeks, during which students studied the foundational knowledge of commercial law. The media covers three levels of content and includes a structured sequence of learning activities: lesson introductions, in-class activities, assignment of tasks, task execution, monitoring and assessment, competence-building exercises, lesson summaries, and final evaluations. These activities aim to enhance vocational students' competence in commercial law for entrepreneurship, as detailed in Table 3.

Table 3: Learning plan for the Commercial Law course. The learning plan spans six weeks

Week	Main topic	Content	Learning activities
11 (120 minutes)	1. Overview of competence in commercial law for entrepreneurship	Orientation and pre-assessment of competence	Introduction to the lesson: Inform students of the learning objectives (treatment) and have them complete a pre-assessment quiz through the LINE OA.

Table 3: Learning plan for the Commercial Law course. The learning plan spans six weeks (continued)

Week	Main topic	Content	Learning activities
12	2. Ability to prepare documents related to commercial law	Basic level: Content on commercial law, focusing on the competence related to the preparation of documents relevant to commercial law.	1. During learning process: Implement the treatment plan as outlined in the learning strategy.
13	3. Being a modern entrepreneur	Intermediate level: Content on laws related to being a modern entrepreneur.	2. Assignment phase: Assign tasks for students to study specific scenarios within the given timeframe.
14	4. Legal responsibilities modern entrepreneurs must know	Advanced level: Content on the legal responsibilities that modern entrepreneurs must know.	3. Task execution phase: Students will engage in learning through the LINE OA using a game-based approach. 4. Self-assessment and evaluation: Students will perform self-assessment via the LINE OA using the game-based system, and also participate in evaluations in the classroom, assessing their learning levels in collaboration with peers and teachers.
15	5. Consolidation of competence in commercial law for entrepreneurship	Consolidation of content: Review of basic, intermediate, and advanced-level content.	Competency practice phase: Students will develop competencies in commercial law for entrepreneurship through the LINE OA using a game-based approach. The teacher will facilitate the learning process by acting as a guide, motivating students, and providing ongoing consultation throughout the students' independent learning journey both in and outside the classroom.
16	6. Assessment of competence in commercial law for entrepreneurship	Post-assessment of competence: Competence assessment after learning, followed by an evaluation of student satisfaction.	1. Conclusion phase: Students will engage in a group discussion to share insights and reflections on the learning process. 2. Evaluation phase: Students will take a post-learning competency test and complete a satisfaction survey through the LINE OA, using a game-based approach.

Table 4: Results of content quality evaluation

Item	Results		
	$\bar{x}$	S.D.	Level
1.1 Content divided into three levels: Basic, Intermediate, and Advanced	5.00	0.00	Very good
1.2 Content and exercises through Edpuzzle platform	5.00	0.00	Very good
1.3 Quizzes in game format via Vonder Go platform	5.00	0.00	Very good
1.4 Basic level content: Commercial law and document preparation competency	5.00	0.00	Very good
1.5 Basic level content: Commercial law knowledge video clips	5.00	0.00	Very good
1.6 Basic level content: Skills in applying commercial law	5.00	0.00	Very good
1.7 Basic level content: Attributes of applying commercial law for entrepreneurship	5.00	0.00	Very good
1.8 Intermediate level content: Law related to modern entrepreneurship	5.00	0.00	Very good
1.9 Intermediate level content: Commercial law knowledge video clips	5.00	0.00	Very good
1.10 Intermediate level content: Skills in applying commercial law	5.00	0.00	Very good
1.11 Intermediate level content: Attributes of applying commercial law for entrepreneurship	5.00	0.00	Very good
1.12 Advanced level content: Legal responsibilities for modern entrepreneurs	5.00	0.00	Very good
1.13 Advanced level content: Commercial law knowledge video clips	5.00	0.00	Very good
1.14 Advanced level content: Skills in applying commercial law	5.00	0.00	Very good
1.15 Advanced level content: Attributes of applying commercial law for entrepreneurship	5.00	0.00	Very good
Average Score	5.00	0.00	Very good

According to Table 4, the overall average score is 5.00, S.D. = 0.00 ($\bar{X}$ = 5.00, S.D. = 0.00) for the evaluation of the content quality of the teaching materials delivered through the LINE OA using game-based learning to enhance commercial law competencies in entrepreneurship for vocational education students, as assessed by legal experts compared to the established criteria, the overall quality is rated as a very good level.

Table 5: Results of the evaluation of presentation quality

Item	Results		
	$\bar{x}$	S.D.	Level
1. LINE OA system with game-based approach			
1.1 Use of LINE OA application	5.00	0.00	Very good
1.2 Self-directed learning format for students	5.00	0.00	Very good
1.3 Organization of standardized learning topics	5.00	0.00	Very good
1.4 Video clips	5.00	0.00	Very good
1.5 Game-based exercises	4.67	0.47	Very good
1.6 Game-based assessments	5.00	0.00	Very good
1.7 AI as a digital learning companion outside the classroom	5.00	0.00	Very good
1.8 Distribution of coupons	4.67	0.47	Very good
1.9 External knowledge links	5.00	0.00	Very good
1.10 Graphic design	5.00	0.00	Very good
Average Score	4.93	0.09	Very good
2. Chatbot system			
2.1 Initial message to begin using the system	4.67	0.47	Very good
2.2 Pre-learning competency assessment for students to access content based on their learning level	5.00	0.00	Very good
2.3 When the score is entered, content corresponding to the student's learning level will be displayed	5.00	0.00	Very good
2.4 Learning level designation: Basic level for scores between 0-6 in the pre-learning assessment	5.00	0.00	Very good
2.5 Learning level designation: Intermediate level for scores between 7-13	5.00	0.00	Very good
2.6 Learning level designation: Advanced level for scores between 14-20	5.00	0.00	Very good
2.7 The use of game-based learning through the LINE OA	5.00	0.00	Very good
2.8 Interactive messaging system	5.00	0.00	Very good
2.9 Entering the symbol "+" in the interactive system to explore content beyond the lesson	5.00	0.00	Very good
2.10 Typing answers to the weekly challenges set by the teacher to stimulate student learning	5.00	0.00	Very good
2.11 Typing the word "problem" will direct the user to the teacher's LINE account	5.00	0.00	Very good
2.12 Typing any other words will redirect the user to the website of the Department of Business Promotion and New Entrepreneurs or ChatGPT specifically created about commercial law for entrepreneurs	5.00	0.00	Very good
2.13 Post-learning quiz and online satisfaction survey	4.67	0.47	Very good
Average Score	4.95	0.07	Very good
Overall average score	4.94	0.08	Very good

According to Table 5, the overall average score is 4.94, S.D. = 0.08 ($\bar{x}$ = 4.94, S.D. = 0.08) for the evaluation of the presentation quality of the teaching materials via LINE OA, using game-based learning to enhance commercial law competencies in entrepreneurs for vocational students. This evaluation was conducted by experts in the field of educational technology, and compared with the established criteria, the overall quality is rated as a very good level. In terms of specific aspects, the category with the highest ranking is the chatbot system, which received a very good level ($\bar{x}$ = 4.95, S.D. = 0.07). The second-highest average score was for the LINE OA system with a game-based approach, also rated at a very good level ($\bar{x}$ = 4.93, S.D. = 0.09).

3.3 The results of comparing commercial law competencies in entrepreneurs for vocational students before and after learning through the LINE OA system using game-based learning

Table 6: Results of the analysis of commercial law knowledge competence

Commercial law competence in entrepreneurs	N	Number of exams	Pretest		Posttest	
			$\bar{x}$	S.D.	$\bar{x}$	S.D.
Knowledge of commercial law	40	5	1.91	0.67	3.38	1.23
Skills in applying commercial law	40	8	2.85	1.12	4.80	1.36
Attributes of applying commercial law in entrepreneurship	40	7	1.59	0.55	4.85	1.29
Overall average score	40	20	6.30	1.84	13.03	3.15

According to Table 6, the average scores before and after learning, categorized by commercial law competencies in entrepreneurs for the sample group, show that all competencies had higher average scores after learning compared to before. Furthermore, the average post-learning scores exceeded half of the total number of items for each competency.

Table 7: The comparison of commercial law competencies in entrepreneurs before and after learning

Scores	N	$\bar{x}$	S.D.	t	df	Sig
Pretest	40	6.30	1.84	13.88	39	.000*
Posttest	40	13.03	3.15			

* $p < .05$

According to Table 7, the comparison of commercial law competencies as entrepreneurs for the sample group shows that the pre-learning competency score via the LINE OA platform with a game-based approach had an average of 6.30 with a standard deviation of 1.84 ($\bar{x} = 6.30$, S.D. = 1.84). For post-learning, the score increased to an average of 13.03 with a standard deviation of 3.15 ($\bar{x} = 13.03$, S.D. = 3.15). When compared, the post-learning competency level in commercial law for entrepreneurs was significantly higher than before learning through the LINE OA with a game-based approach, with statistical significance at the .05 level (t-test = 13.88)

3.4 The results of the student satisfaction evaluation with the instructional media via LINE OA using a game-based learning to enhance commercial law competencies as entrepreneurs in vocational students

Table 8: The level of satisfaction of the sample group

Item	Results		
	$\bar{x}$	S.D.	Level
1. LINE OA media using game-based learning:			
1.1 Use of the LINE OA application	4.45	0.55	High
1.2 Division of learning into three levels: Basic, Intermediate, and Advanced	4.48	0.55	High
1.3 Video clips	4.55	0.50	Highest
1.4 Exercises in the form of games	4.58	0.49	Highest
1.5 Quizzes in the form of games	4.58	0.49	Highest
1.6 The self-directed learning approach for students	4.55	0.55	Highest
Average Score	4.53	0.52	Highest
2. Teacher's instructional management			
2.1 Creation of instructional materials by the teacher	4.40	0.62	High
2.2 Assignment of tasks by the teacher	4.43	0.59	High
2.3 Assistance and consultation provided by the teacher	4.58	0.49	Highest
2.4 Teacher's coupon distribution system	4.50	0.59	High
2.5 Teacher's management of teaching through LINE OA media using game-based learning	4.55	0.50	Highest
Average Score	4.49	0.56	High
3. Enhancement of commercial law competencies for vocational students as entrepreneurs:			
3.1 Learning knowledge of commercial law	4.63	0.48	Highest
3.2 Learning skills to apply commercial law	4.63	0.58	Highest
3.3 Learning the attributes of applying commercial law in entrepreneurship	4.50	0.55	High
3.4 Developing students' prior knowledge	4.60	0.49	Highest
3.5 Learning that enhances commercial law competencies for vocational students as entrepreneurs	4.60	0.49	Highest
Average Score	4.59	0.52	Highest
Overall average score	4.54	0.53	Highest

According to Table 8, the overall satisfaction of the sample group regarding the teaching media via LINE OA using game-based learning to enhance commercial law competencies for vocational students as entrepreneurs is at the highest level. The overall average score is 4.54, with a standard deviation of 0.53. ($\bar{x} = 4.54$, S.D. = 0.53). When examining each aspect, the highest-rated area is the enhancement of commercial law competencies for vocational students as entrepreneurs, with an average score of 4.59 and a standard deviation of 0.52. ($\bar{x} = 4.59$, S.D. = 0.52). The second-highest rated area is the LINE OA using game-based learning, which also falls at the highest level, with an average score of 4.53 and a standard deviation of 0.52. ($\bar{x} = 4.53$, S.D. =

0.52). Meanwhile, the aspect of teaching management by the instructor is rated at a high level, with an average score of 4.49 and a standard deviation of 0.56 ($\bar{x} = 4.49$, S.D. = 0.56).

The study on the factors of commercial law competencies for vocational students as entrepreneurs is divided into three parts: 1) Knowledge of commercial law, 2) Skills in applying commercial law, and 3) Attributes of applying commercial law in entrepreneurship. The findings suggest that the development of teaching media should encompass all three factors of commercial law competencies for entrepreneurs. The study used the concepts of Parry (1996) to encourage vocational students to establish their own businesses by applying various aspects of the law in beneficial ways, conducting business correctly and safely, reducing the risk of legal issues, and avoiding societal burdens. These results align with Platts-Mills and Wapples (2023), who emphasize raising awareness of legal issues impacting entrepreneurs, with law teaching focusing on recognizing new opportunities and building confidence in following them to develop skills that enable students to succeed at an entrepreneurial instinct level. Similarly, Ronstadt (1987), as cited in Kuratko (2011) argues that effective entrepreneurship teaching should demonstrate how to behave as an entrepreneur to help learners succeed. Based on these findings, the researchers used the results to further develop the teaching media content.

The development of teaching media through a LINE OA using game-based learning to enhance commercial law competencies for vocational students was organized into three levels: 1) Basic, 2) Intermediate, and 3) Advanced. The teaching media were developed as video animations and games, with AI serving as a digital learning companion outside the classroom via the LINE OA application called "Brain Lump." The content was integrated into a six-week Commercial Law course. The learning activities through the LINE OA utilized game-based learning from lesson introduction to task assignments, task execution, evaluation, competency practice, summarization, and assessment, to promote commercial law competencies in entrepreneurs for vocational students. The evaluation of the media showed that the content quality was rated at a very good level, and the presentation media received a very good level. The ADDIE model design principles (Analyze, Design, Develop, Implement, and Evaluate) were used in creating the media. The decision to use LINE OA as the teaching medium was based on its popularity in communication in Thailand. The LINE OA offers features like automatic messaging, systematic lesson organization, and the integration of games, coupons, and links to external websites for a more engaging and educational experience. The teaching method emphasizes self-paced learning and game-based elements suited to the students' age group, in line with research by Seibert et al. (2020) and Tran et al. (2024), which highlight Digital Learning Companions (DLCs) as a method for personalized online learning that uses communication technology to facilitate access to supplementary educational media. This research aligns with Schlimbach et al. (2024), who describe Virtual Learning Companions (VLCs) as designed learning experiences to meet individual student needs, using blended learning and distance education to support lifelong learning and foster closer connections with users. The use of game-based learning has also been found to improve educational engagement and motivation in vocational students, as shown in Dahalan et al.'s (2024) *Gamification and game-based learning for vocational education and training: A systematic literature review*. This method is particularly effective for addressing the educational needs of the 21st century.

The study found that the average scores before and after learning, according to the commercial law competencies for entrepreneurs, showed a significant increase across all competencies after learning, with scores exceeding half of the questions in each competency. Statistical comparisons of pre- and post-learning results revealed a significant improvement in the students' competencies after learning through the developed media, with a p-value less than .05. This suggests that the process of promoting commercial law competencies through structured, progressive learning levels helped students gradually build from basic legal contract knowledge to understanding the legal aspects of modern entrepreneurship, including awareness of legal responsibilities for new entrepreneurs. The video content, developed through animation, simulated the business creation process for young entrepreneurs in the digital age. Game-based exercises and tests fostered engagement throughout the learning process, with teachers providing continuous support both inside and outside the classroom via the LINE OA. These results align with the hypotheses set forth and are consistent with research by Yamkuan and Niwattanakul (2017), which found that game-based learning significantly enhances mathematics process skills in students.

The overall satisfaction of the sample group with the teaching media via the LINE OA using game-based learning to enhance commercial law competencies for vocational students was rated at the highest level. This aligns with the concept of satisfaction proposed by Preedeedilok (2016), which views satisfaction as a sense of pleasure or contentment from various components and motivations. This finding aligns with the set hypotheses and corresponds with the study by Poonpon et al. (2024), which reported that the satisfaction level of participants with TIGA's digital learning platform, specifically *The TIGA English learning platform for enhancing language learners' skills in digital environments*, was at the level of "strongly satisfied". This platform was found to be particularly effective for classrooms with diverse learner abilities, enabling gifted students to progress

ahead of their peers while slower learners could advance at their own pace. Teachers played a crucial role in guiding students' learning activities through the platform by providing ongoing support and supervision. The platform was also noticeable in transforming the learning environment into a more engaging and enjoyable experience. Recommendations included that teachers should clearly define their roles in using the platform, offering guidance, explanations, and support to students. Additionally, improvements in the platform's graphics to make it more visually appealing and engaging were suggested. These recommendations were incorporated into this study, leading to the highest level of satisfaction reported by participants. An interesting finding also emerged in that participants expressed a high level of satisfaction with teachers' instructional management. However, when compared to satisfaction with other aspects, such as instructional media and the promotion of commercial law competencies, the satisfaction levels for these areas were slightly higher, respectively. To enhance instructional strategies further, researchers should explore other active learning approaches. For instance, Princhankol and Thamwipat (2018) developed cooperative learning media and special events to raise funds for financially disadvantaged students in the Faculty of Industrial Education and Technology. Their study revealed the highest level of student satisfaction with cooperative learning. This demonstrates that cooperative learning strategies could be highly effective for future applications. Similarly, Thamwipat et al. (2019) developed multimedia and activities to promote products created by state enterprise communities under the Bangmod Project 4.0 through community-based learning. Their findings indicated the highest level of satisfaction with this approach. These results suggest that multimedia and activities designed under community-based learning models are high-quality tools for promoting local community products. Therefore, emphasizing alternative active learning methods is an important consideration for future research, alongside designing and developing innovative instructional media using educational technology.

The study concludes that the development of instructional media via LINE OA using game-based learning effectively enhances commercial law competencies for vocational students, covering knowledge, skills, and application attributes in the context of entrepreneurship. The interactive learning approach using modern, accessible technology like LINE OA, combined with self-directed learning and teacher support, creates a suitable environment for vocational students to enhance their commercial law competencies, developing essential 21st-century skills.

4. CONCLUSION

The study on the factors of commercial law competence in entrepreneurs for vocational education students is divided into three parts: 1) Knowledge of commercial law, 2) Skills in applying commercial law, and 3) Attributes of applying commercial law in entrepreneurship. After analyzing the concepts and factors of commercial law competence in entrepreneurs to develop teaching media through the LINE OA using a game-based approach to promote commercial law competence for vocational students, the study resulted in the development of teaching media that includes three levels of content: 1) Basic, 2) Intermediate, and 3) Advanced, in the form of video animations and games. These materials were evaluated by experts in content and media presentation, showing the content quality at a very good level ($\bar{x} = 5.00$, S.D. = 0.0), as well as the quality of the media presentation ($\bar{x} = 4.94$, S.D. = 0.08). The teaching media includes AI as a digital learning companion outside the classroom via the LINE OA named "Brain Lump," embedded within the 6-week Commercial Law course curriculum for second-year students in the Business Computer program at the Bangkok College of Business Administration and Tourism, with 40 students enrolled in the first semester of the 2024 academic year. The post-learning evaluation of the developed teaching media revealed that the competence of the sample group, after learning through the LINE OA using a game-based approach, was significantly higher than before, with statistical significance at the .05 level (t-test = 13.88). Additionally, the sample group's overall satisfaction with the instructional media was at the highest level ($\bar{x} = 4.54$, S.D. = 0.53).

4.1 Limitations

The digital learning companion system has limitations regarding the automatic menu bar of the LINE OA, as it can only be accessed via mobile phones. However, this issue can be addressed by using a chatbot system for access instead.

4.2 Suggestions for further research

Future studies should expand the online lessons to promote commercial law competence for vocational education students. These lessons could be displayed as an online exhibition in the metaverse to generate greater student interest in new media and encourage further engagement with commercial law courses. Additionally, the use of engaging proactive learning strategies, alongside the integration of modern educational technologies, should be considered. Active learning is an approach that emphasizes students' active participation in the learning process. It encourages students to engage in practical activities, construct

knowledge, and independently connect content. Key forms of active learning include: cooperative learning, which emphasizes group work where each student has a specific role to promote teamwork and mutual support; Project-Based Learning (PBL), where students develop knowledge and skills by working on projects related to real-world issues; Simulation-based learning, which uses realistic simulations or case studies to enhance analytical and decision-making skills; Experiential learning, where students learn from real-world experiences such as experiments or fieldwork; and the Flipped classroom, where students study content on their own before class, using class time for discussions or group activities. These approaches effectively increase student engagement, enhance problem-solving and analytical skills, and foster lifelong learning.

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