Blended Learning with Mobile Learning Tools in Financial Curricula: Challenges, Opportunities, and Implications for Student Engagement and Achievement

Hsin-Jung Hsieh[*] iD
Kainan University, Taoyuan, Taiwan

Abstract. This study explores the impact of teaching strategies for blended learning, which combines mobile learning with traditional classes in financial curricula in Taiwan. The aim of this study is to address the challenges and opportunities of using digital technology in education, especially in the context of the COVID-19 pandemic and the popularity of social media apps among young students. The study adopts mixed methodologies, including questionnaires and qualitative analysis, to examine whether integrating LINE@ and Zuvio apps into the blended learning strategy enhances students' class engagement, learning experience, and overall achievement. The results show that the blended learning strategy significantly improves students' learning outcomes, especially in elective courses. The qualitative analysis also reveals the strengths and weaknesses of using different mobile learning tools. It highlights a blended learning model, emphasizing the value of effective teacher-student interaction, and demonstrates that digital technology complements traditional face-to-face teaching. Teachers can give students more confidence in using these digital tools, thereby enhancing the quality of teaching. Furthermore, this study suggests the need for teachers to consider their students' and courses' characteristics and needs when implementing blended learning. The study contributes to the literature on blended learning and Finance education. It provides insights and suggestions for teachers and researchers who want to implement blended learning strategies in other disciplines and contexts.

Keywords: Blended Learning; Mobile Learning; LINE@; Zuvio; Financial curricula

1. Introduction
Many researchers have pointed out that student-oriented flipped teaching significantly improves students' learning motivation and achievement (Fautch,

[*]Corresponding author: Hsin-Jung Hsieh; hjh@gapps.knu.edu.tw

2015; Jensen et al., 2018; Sosa Díaz et al., 2021) and that mobile learning enhances students' initiative and engagement (Mutambara & Bayaga, 2021; Oliveira et al., 2021; Tahil, 2023; Chamorro-Atalaya, 2023; Murire, 2023). Building on this work, the current study explores the impact of teaching strategies for blended learning, which combines mobile learning with traditional classes in financial curricula in Taiwan. It is hoped that this study will provide sound evidence for applying mobile learning as a blended learning strategy within Finance education.

UNESCO has stated that digital learning can help technology to serve education, improving access to education for all and promoting high-quality learning. However, the adoption of digital technology for education and learning remains controversial. Policymakers should consider whether technology is appropriate for the learner's background and learning needs, as the adoption of digital technologies varies according to community and socio-economic level, teacher willingness and readiness, education level, and national income. Instead, the focus should be on learning outcomes; digital technology must complement face-to-face interaction with teachers, rather than replacing it. Technology should support, without diminishing, the human connections on which teaching and learning depend. Well-trained teachers and supported and valued teaching strategies must remain in place in order to ensure quality education (UNESCO, 2023). It is the hope of academics that students will be able to use digital technology to enhance their learning efficiency in class rather than being distracted by it or allowing it to have a negative impact on their progress in learning. According to a survey by Taiwan King Car Cultural and Educational Foundation, which was conducted among teachers working in high schools, secondary and elementary schools nationwide in 2016, 62.1% of teachers think that students' use of mobile phones in class represents a significant challenge to classroom management. In particular, teachers indicated that social networks on mobile devices strongly influence students (63.5% of the survey respondents). Within traditional lecture classes at university, professors require clarification on the application of mobile devices in class (Berei & Pusztai, 2022; Rocca, 2010; Zachos et al., 2018). In some classes, students tend to concentrate on non-course-related exploration due to the popularization and unbounded communication, information and media available on mobile devices. In spite of teachers doing their best to engage the learners, some students remain immersed in social communication and enjoying the online world. Consequently, students' lack of engagement and concentration has impacted teachers' enthusiasm, resulting in the declining quality of teaching. Nevertheless, it can be argued that, along with the mature development of the Internet, mobile devices, and digital technology, the learning environment should not be limited solely to schoolrooms. As mobile learning models have been extended, teachers need to reinvigorate the inefficient learning situations mentioned above and enable students to gain valuable learning from their mobile devices (Zachos et al., 2018).

Furthermore, Huang (2017) and Myers et al. (2012) have noted some disadvantages of traditional classes, such as students' lack of willingness to learn, poor teacher-student interaction in class, insufficient support for individual students who may need individualized attention, and difficulty in

further exploring students' critical thinking. Therefore, we aim to achieve the following objectives with mobile learning models in our teaching practice: (1) To flip the class; (2) To create positive teacher-student interactions; (3) To promote high quality education and student learning; (4) To make mobile learning and blended learning more effective.

Researchers do not concur that the current difficulties in education can be blamed on mobile and digital learning models. Especially during the COVID-19 pandemic, mobile learning, social community, and various online learning platforms helped to keep students studying (Arsenijević et al., 2023; Francis et al., 2022; Papademetriou et al., 2022; Tahil, 2023; Chamorro-Atalaya, 2023; Murire, 2023; Agarwal, 2020; Al-Naabi, 2023; Cheung, 2023; Barfi, 2023). A more positive approach would be to take advantage of digital media and high-adhesive social communication software, with which young students are highly familiar, by using it for the learning platform between teachers and students (Oliver & Trigwell, 2005; Veytia-Bucheli et al., 2020; Zachos et al., 2018; Chamorro-Atalaya, 2023 ; Murire, 2023).

As of 2023, the social communication app LINE has over 1 billion users worldwide, more than 21 million of whom are in Taiwan (constituting more than 91% of the population). According to a 2017 Usage Behaviours Study survey, released by Nielsen Taiwan, LINE continues to increase its active users year on year, with 94% of respondents indicating that they had used LINE in the past seven days. Over 80% of users reported that they could not resist clicking when they saw the unread message notification, even if they were busy, and 76% wanted to check their phones on hearing LINE alerts. In line with UNESCO recommendations, the adoption of digital technologies must be appropriate according to the learner's background, learning needs, educational level, community, and socio-economic level. The LINE app has an extremely high following among young students in Taiwan. This study explores whether the use of LINE@ in class as a learning strategy helps enhance students' learning experience and achievement for the practice of blended learning. In terms of social communication, we intend to implement LINE@ in and after class to enhance interaction between teachers and students.

In addition, researchers have suggested adopting a game-based learning concept into course design. Game-based strategy in teaching and learning not only enhances students' learning motivation and performance but also encourages students in problem-solving and collaborative-communicating (Kuo et al., 2022; Lin et al., 2022; Wang, 2023). The Zuvio app's Interactive Response System (IRS) contains instant ask-and-answer features, making students feel as though they are playing games while learning. Although financial curricula currently focus on theory-based classes, teachers could prepare activities to discuss upcoming financial issues to guide students in applying practical financial knowledge, especially as dealing with fast-changing circumstances becomes ever-more critical. Though many studies have already shown that a breakthrough teaching strategy can help students develop higher professional competence and literacy (Betty et al., 2014; Bristol, 2014; Chiou et al., 2015; Espada-Chavarria et al., 2023;

Hou, 2023; Huang, 2017; Keller et al., 2023; Sosa Díaz et al., 2021; Zachos et al., 2018; Agarwal, 2020; T., 2019), this study will focus particularly on blended learning, which combines traditional classes with mobile learning, to achieve the teaching goals of competence in Finance education.

In summary, the primary purpose of this study is to explore whether student-oriented teaching strategies for blended learning can help to promote students' engagement and achievement in classes through the use of highly addictive, real-time interactive software, and easy-to-use teaching platforms in financial curricula.

2. Literature Review
This study aims to observe students' learning performance by implementing mobile learning into the curriculum design of traditional face-to-face Finance education and using LINE@ and Zuvio apps to support teaching; the study results will be analysed and applied to other traditional courses. First, we analysed the relevant literature, as explained below.

2.1. Teaching Strategies
Oliver and Trigwell (2005) conducted research into blended learning and defined it as an approach to education that integrates online instruction and digital technology in teaching and learning with traditional face-to-face classrooms (Bielawski & Metcalf, 2003; Graham et al., 2005; Valiathan, , 2002). Due to the mature development of the Internet, mobile devices, and digital technology, education is no longer limited to face-to-face classrooms. Therefore, blended learning has become increasingly popular by combining traditional face-to-face classes with technology-mediated learning (Cheung, 2023; Barfi, 2023; Ali, 2023; Ding & Li, 2011; Espada-Chavarria et al., 2023; Graham et al., 2005; Min & Yu, 2023; Neo & Neo, 2004).

As described by Graham et al. (2005), blended learning has been widely adopted across higher education and corporate training programs. Indeed, Massive Open Online Courses (MOOCs) and Modular Object-Oriented Dynamic Learning Environments (Moodles) have been widely used for blended learning in higher education in Taiwan. Both MOOCs and Moodles can provide excellent support for students in terms of class preparation, in-class support, and post-class review in traditional face-to-face classes; they have also demonstrated positive effects in many studies (Chang & Yeh, 2014; Lin et al., 2016).

On the other hand, Berei and Pusztai (2022) noted that students' lack of independent learning ability, poor time management, excessive amounts of time spent on the Internet, online games, and other social media while learning through digital technology have led to lower effectiveness and higher concentration crisis risk of online learning, as well as an increased intention to drop out of university. Zitha et al. (2023) assessed student participation and experience on online platforms, including Microsoft Teams, Google Teams, Moodle, and WhatsApp during the advent of COVID-19. Their results indicated poor interaction between students and lecturers due to relatively new and tricky

learning platforms. Specifically, first-year Science Foundation students needed help familiarising themselves with learning platforms. Al-Naabi (2023) pointed out that the use of Moodle in higher education has declined since the pandemic because of the need to develop clear policies and rules to address the inefficiencies created by students' use of the Moodle platform as well as the need to help reduce teachers' workload in higher education.

As a consequence of the pandemic, the value of teacher-student interactions in face-to-face classrooms, where learners can benefit from teachers' leading, teaching, and problem-solving, has been highlighted. However, there is a possibility that integrating readily available mobile devices and easy-to-use software, which students prefer, into traditional face-to-face classes will enhance the benefits of blended learning.

2.2. Learning Approaches and Learning Effectiveness

Regarding the effectiveness of blended learning, Osguthorpe and Graham (2003) and Singh (2003) indicated that blended learning gave students more flexible choices and extraordinary learning performance. In the study by Owston et al. (2013), it was found that blended learning results in higher achievement than the traditional face-to-face model, with the learning of higher achievers especially becoming more enhanced. Chang and Yeh (2014) adopted blended learning that integrated a multimedia mobile learning system in a Moodle platform and a Facebook discussion forum with a traditional lecture, then used a multistage fuzzy system and quasi-experimental design to conduct research questionnaires on students' learning effectiveness, satisfaction with the system, and effectiveness of reflective learning. The conclusion was that blended learning effectively promotes university students' learning performance.

Chang and Yeh (2014) and Wang (2016) focused their research on implementing a collaborative learning approach with the digital platforms Edmodo and Zuvio IRS, respectively, in blended learning. Their studies revealed that not only did participants hold a more positive attitude toward blended learning but it also improved teacher-student interaction and learning effectiveness.

Wang (2016) conducted experimental-design research using a hybrid method that integrated Project-Based Learning (PBL) with the online teaching platform Zuvio. This blended learning approach enhanced students' English learning motivation and significantly promoted their mid-term test scores. Lin et al. (2016) undertook pre-experimental design research on a blended learning approach combining Moodle with face-to-face classroom learning. Their results indicated that students not only benefitted from the learning outcomes but their attitudes toward studying mathematics in a blended learning environment also improved; however, not all the students or groups of students according to gender gained an increase in terms of learning effectiveness. In conclusion, the results of blended teaching are highly regarded by most researchers.

2.3. Finance Education

Most of the abovementioned studies have been conducted via learning platforms in subjects such as Language Learning (Lin et al., 2022; Wang, 2016; Wang, 2023), Education (Huang, 2017), Mathematics (Betty et al., 2014; Lin et al., 2016; Marchisio et al., 2022), Medicine, and Nursing (Bristol, 2014; Chiou et al., 2015), as well as STEAM-related courses (Fautch, 2015; Kuo et al., 2022; Mutambara & Bayaga, 2021; Nazir & Brouwer, 2019; Zitha et al., 2023). The traditional Finance curriculum focuses on theory-based lessons, and applying theory with practice should draw more attention to the rapidly changing financial market. Therefore, this research focuses on the teaching practice of integrating digital technology into traditional classes in Finance education. In addition to integrating practical finance issues, the use of social media tools in daily life is also expected to be integrated into the teaching strategy for Finance students.

2.4. New Learning Applications in Class

Social networking tools have been widely adopted across all industries in Taiwan, including the government and academia. Social media learning and interaction systems are used as teacher-teacher, teacher-student, and student-student interfaces. Nazir and Brouwer (2019) observed the behaviours of students using a Facebook application for higher education in science (STEM). They found a new Online Collaborative Learning (OCL) framework element, and suggested the addition of "student–community" interaction. Other social communication apps for teaching and learning include Chatbot, WhatsApp, LINE, Facebook/Messenger, Instagram, Viber, and Twitter (Chamorro-Atalaya, 2023; Murire, 2023; Higueras-Rodríguez et al., 2020; Lersilp & Lersilp, 2019; Papademetriou et al., 2022; Veytia-Bucheli et al., 2020; Zachos et al., 2018). As mentioned in the introduction, the social community app LINE is very widely used in Taiwan. However, as Papademetriou et al. (2022) raised some privacy concerns, we use LINE@ as a teaching strategy for blended learning in this study. Unlike personal LINE accounts, an official LINE@ account offers business solutions that enable business operations and information dissemination in the social network. By using LINE@, businesses can send group messages to all of their customers at once and also answer individuals' questions in a 1:1 chat room. While LINE@ is primarily deployed in marketing promotions, especially in commercial activities, teachers can use the basic free plan to access the functions necessary for teaching and learning activities. Few studies have yet been published on the teaching practice of applying LINE@, which is more popular and easier to use on mobile devices to support real-time user interactions. In this preliminary study, we will explore the practice of introducing LINE@ as a teaching strategy in the Finance curriculum. Furthermore, compared to other multimedia teaching platforms, Zuvio provides substantial real-time assistance and collaborative peer assessment to support teacher-student interactions in the classroom as well as quantitative and qualitative analysis after class for recording individual learning records. Furthermore, Zuvio can be used in a browser on computers, tablets, and any digital carrier, and is easier to use on mobile devices. In Taiwan, all university students have at least one mobile device and are used to operating various apps on their mobile; therefore, this study seeks to overcome barriers such as lack of

equipment and technology usage anxiety, as mentioned in previous studies (Berei & Pusztai, 2022; Francis et al., 2022; Min & Yu, 2023).

3. Research Methodology
3.1. Methodology and Hypotheses
This study adopts mixed methodologies, including questionnaires and quantitative method, to observe whether integrating LINE@ and Zuvio into the blended learning strategy within Finance curricula helps to promote students' achievement and engagement in classes. We intend to observe whether student-oriented mobile learning strategies can help in solving the identified classroom management problems of students' low concentration and willingness to learn. Therefore, this study will formulate and structure statistical tests based on the following research hypotheses.

- H1: A blended learning strategy using a mobile learning app enhances students' class engagement in Finance curricula.
  - o H1a: A blended learning strategy using a mobile learning app improves my interest in learning.
  - o H1b: A blended learning strategy using a mobile learning app increases students' willingness to attend classes.
- H2: A blended learning strategy using a mobile learning app promotes students' learning experience in Finance curricula.
  - o H2a: A blended learning strategy using a mobile learning app promotes students' motivation to ask questions.
  - o H2b: A blended learning strategy using a mobile learning app enhances students' willingness to answer questions.
  - o H2c: A blended learning strategy using a mobile learning app helps students' learning process.
- H3: A blended learning strategy using a mobile learning app significantly impacts students' learning achievement in Finance curricula.
- H4: A blended learning strategy using a mobile learning app promotes effective class management.
- H5: A blended learning strategy using a mobile learning app induces high student satisfaction with mobile learning resources.

The following figure shows how we integrated the conceptual model with the research hypotheses.
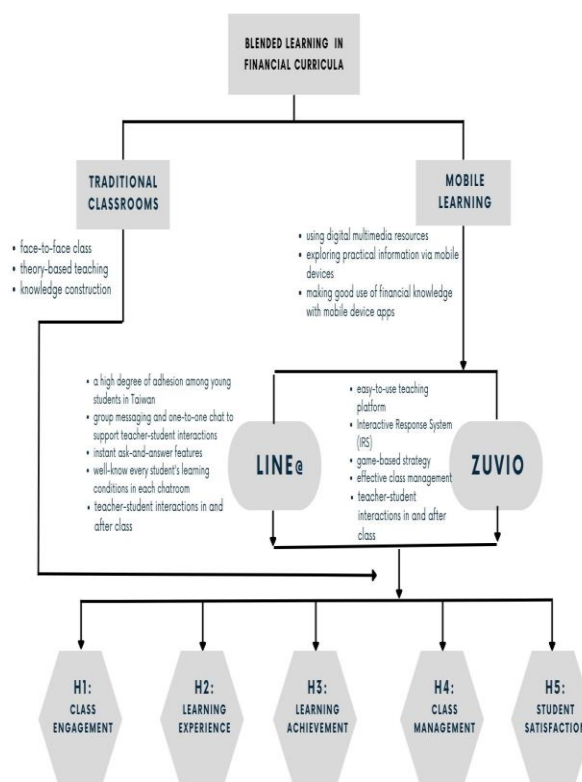
Figure 1: Conceptual model with integrated hypotheses

3.2. Sampling Processes and Descriptions

Invitations to participate in this study were sent to students who have taken courses including "Financial Markets," "Finance Management," "Financial Statement Analysis and Business Valuation," and "Funds Management" in the Department of Finance and the Department of Accounting at a Taiwan university in the 2018 academic year. Important Finance curricula, from basic courses to more advanced levels, were included. At the beginning of the courses, the researchers and collaborative researchers explained the aims and procedures of this study and demonstrated how to operate the Zuvio and LINE@ apps. Having confirmed that the respondents fully understood their rights and obligations and agreed to join our research, 136 students intended to participate. However, in order to keep records of learning experiences and collect various data from courses during the whole semester, students with attendance rates of less than 30% were removed, so that the total number of sample participants remaining was 118. Observations, questionnaires, and students' records in the apps were collected in order to achieve quantitative and interpretative research. Table 1 demonstrates the implementation instrument and a more detailed breakdown of the number of students from various courses in our sample.

Table 1: Instrument of blended learning and sample data

Course Title (Required/Elective course)	No. of Students	No. of Participants*	Instrument
Financial Markets (Elective)	41	38	Zuvio
Finance Management (Elective)	60	49	LINE@
Financial Statement Analysis and Business Valuation (Required)	26	23	LINE@+Zuvio
Funds Management (Elective)	9	8	LINE@+Zuvio
Total	136	118	

*Number of participants does not include those students who volunteered to participate but whose attendance was found to be less than 30%

In addition, an end-of-semester questionnaire survey was conducted. Of 118 questionnaires that were distributed, 106 replies were finally collected (effective response rate was 89.8%). Cronbach's α was found to be 0.927, indicating that the questionnaire scale had good internal consistency. The sample descriptions are summarized in Table 2.

Table 2: Demographic characteristics of the sample (N = 106)

Category	Category	Frequency	Percentage (%)
Gender	Female	44	41.5
	Male	62	58.5
Year of study	4th+	25	26.4
	3rd	33	18.9
	2nd	20	31.1
	1st	28	23.6
Faculty (Field of study)	Business	94	88.7
	Others	12	11.3

4. Results and Discussion

4.1. Testing Processes and Outcomes

This study was conducted among students enrolled in four courses in the 2018 academic year, including the "Financial Markets" course, which was mainly for first-year students, and the "Financial Statement Analysis and Business Valuation" course for junior students in the Department of Finance, the "Finance Management" course for sophomore students in the Department of Accounting and the "Funds Management" course for sophomore students of the accounting department who were continuing their education. All of these four courses are specialized Finance curricula. Besides expounding basic theory in a traditional class, the researchers designed in-class, step-by-step activities to enhance students' ability to use digital multimedia resources, explore practical information via mobile devices, make good use of their financial knowledge using mobile device apps, and follow teachers' instructions to complete assessments, thereby attaining the goal of knowledge and competency integration. Contrary to the students' experiences of teaching in the previous academic year, this project employed the instant response function of LINE@ or Zuvio to promote teacher-student interactions and observe students' learning experiences. Crosschecking the practice observation among courses and

students, and tracking students' learning performance in different courses would help to improve the effectiveness and robustness of the results in this study.

Table 3: Students' response frequencies (percentage) on the implementation of blended learning

	SA&A	SA	A	N	D	SD
1. Utilization of LINE/Zuvio in class improved my interest in learning.	82 (77.4%)	45 (42.5%)	37 (34.9%)	22 (20.8%)	0 (0%)	2 (1.9%)
2. Utilization of LINE/Zuvio in class increased my willingness to attend.	80 (75.5%)	44 (41.5%)	36 (34%)	22 (20.8%)	2 (1.9%)	2 (1.9%)
3. Utilization of LINE/Zuvio in class promoted my motivation to ask questions.	83 (78.3%)	35 (33%)	48 (45.3%)	21 (19.8%)	0 (0%)	2 (1.9%)
4. Utilization of LINE/Zuvio in class enhanced my willingness to answer questions.	86 (81.2%)	43 (40.6%)	43 (40.6%)	18 (17%)	0 (0%)	2 (1.9%)
5. Utilization of LINE/Zuvio in class helped my learning process.	89 (84%)	46 (43.4%)	43 (40.6%)	14 (13.2%)	1 (0.9%)	2 (1.9%)

* Effective Numbers=106 (effective response rate 89.8%), Cronbach's α = 0.927.

** The questionnaire was answered using a five-point Likert scale.

***SA = Strongly Agree, A = Agree, N= Neutral, D = Disagree, SD = Strongly Disagree

As shown in Table 3, more than 75% of the participants responded "Agree" or "Strongly Agree" to five descriptions concerning students' learning experiences. Notably, 81.2% of participants expressed a greater willingness to answer questions, and 84% recognized that mobile learning had helped their learning process. This indicates that the blended learning strategy integrated with mobile learning enhances students' class engagement and learning experience in the Finance curriculum. However, the impact on learning achievement was according to students' grades from the corresponding curricula, taught by the same teacher with the same content materials in the semester prior to implementing blended learning. The statistical independent t-test was used to analyse data to compare the traditional teaching method (control groups) and the LINE@ or Zuvio blended learning strategy, based on the performance of different students in the same courses in the previous and the experimental semesters.

Table 4: Mean and statistic difference test of learning achievement before and after blended learning

Course Title (Required/Elective course) / Testing Semester no.	Instrument	Score Before	Score After	p-value
Financial Markets (Elective) / 1052 vs.1072	Zuvio	64.95	72.33	0.097*
Finance Management (Elective) / 1061 vs.1071	LINE@	37.86	66.18	0.000***
Financial Statement Analysis and Business Valuation (Required) / 1051 vs.1071	LINE@+Zuvio	77.91	76.83	0.767
Funds Management (Elective) / 1062 vs.1072	LINE@+Zuvio	83.36	86.97	0.534

* means p-value < 10%, *** means p-value < 1%

According to the results shown in Table 4, blended learning strategies to improve student engagement and learning outcomes are statistically examined++. For elective courses, in particular, the intervention strategies positively contribute to students' learning experience. In general, students taking elective courses might be said to be more interested in learning the course. However, students can achieve better learning performance by implementing mobile learning, which verifies the effectiveness of this blended learning strategy in promoting learning achievement. The elective course "Funds Management" also showed a positive but insignificant improvement. Because LINE@ and Zuvio were implemented in the course simultaneously, it was hypothesized that the statistically significant positive help was only observed in the course where only a single instrument was used. Teachers are therefore advised to focus on a single tool in using instructional strategies to avoid the barrier of the student's cognitive load caused by using multiple tools (Blackhow et al., 2009). Another possible reason for this is that it is difficult to control for the demographic characteristics of the sample. This course was offered to younger students in the Department of Finance in semester No.1062 but to older students in Continuing Education of the Department of Accounting in semester No.1072.

Students' different age groups may have an impact on their proficiency in using mobile applications, which also corroborates UNESCO's recommendation that policy implementers should consider students' backgrounds and technological capabilities when using digital technologies in education (UNESCO, 2023). Moreover, there were only eight participants in semester No.1072, which would cause an improper statistical examination. Otherwise, the "Financial Statement Analysis and Business Valuation" score was not improved. Although the decrease is insignificant, as this course is only one of the required courses in the Department of Finance, the researchers assumed that the blended learning strategy made no significant difference because students usually devoted more effort to those required courses, whatever the teaching style. More importantly, with or without mobile learning apps, this course has been designed to use project-based learning strategies to guide students to finish the company

evaluation reports progressively, so only a few innovative teaching strategies will be able to provide more significant learning outcomes.

4.2. Researchers' Observations
In implementing a curriculum strategy using LINE@, the researchers highlighted the features of group messaging and one-to-one chat to support teacher-student interactions. Through this, teachers can inform, construct, and edit related information such as course activities, assignments, and tests for all students with just one touch using the LINE@ app on mobile devices or the web management page on computers. This group messaging function allows teachers to deliver information at a preset moment and students can provide an interactive response and complete the task in class. In addition, students can ask questions, seek feedback and receive the teacher's response with LINE@ after class. Certain features of LINE@ make class announcements more effective, encourage students to focus on the process and course activities in class, and increase the frequency of teacher-student interactions. Moreover, all of the learning records can be kept within the LINE@ app, so that the teacher can know every student's learning situations in each chatroom, and students can be more fully apprised of their learning status. For students, each chatroom is individual, as other students cannot be involved, which encourages students to ask and answer questions more comfortably.

Zuvio was developed as a real-time interactive solution for teaching and learning, and the researchers found that the Zuvio app is more easily integrated with the traditional lessons due to its diversified features, which allow instructors to post course materials, announcements, and assessments on its bulletin boards prior to classes. Additionally, there are features allowing instructors to create discussion topics or assign assessments easily so that students can respond instantly, discuss, and give feedback at anytime and anywhere. Moreover, students can opt to use the GPS Rollcall and Sign-In functions to record their attendance. Even if students do not want to use the GPS function, they can still complete their attendance records with just one click on the Zuvio app, helping teachers to maintain class management more efficiently. Also, Zuvio's peer assessment feature can be used in project-based learning design as it can remind students to evaluate everyone's participation and contribution to the team and the project.

In conclusion, it was found that a blended learning strategy using the LINE@ or Zuvio app significantly enhances students' class engagement, learning experience, and achievement in Finance curricula. It also helps to promote knowledge-action integration and teacher-student interactions, both within and outside of classes. Blended learning with a suitable platform or well-designed digital technology can enable the class to develop in line with instructors' teaching goals.

4.3. Students' Reflections
To evaluate students' feedback, the researchers and collaborative researchers used a systematic qualitative review of data collected from open feedback on

self-made worksheets, including teaching evaluation by semester, and students' satisfaction with the teaching platform and resources. The feedback is summarized as follows.

Table 5: Summary of students' qualitative feedback with the frequency of mentions

Advantages (number of times mentioned)
• The mobile learning app is excellent, interesting, attractive, and exciting. (4)
• The mobile learning app makes it easy to contact teachers, as students can send direct messages to teachers, ask questions privately, and get one-to-one consulting. (3)
• The mobile learning app makes it easy to rollcall, saving time and hassle for teachers and students. (2)
• Course contents are accessible by the mobile learning app, as students can access the course materials without textbooks, download supplementary files directly, and hand in assignments quickly. (2)
• The mobile learning app is free for intercollegiate exchange, providing a platform for students to interact with peers from other colleges. (1)
• The mobile learning app induces a higher willingness to ask questions, as students may feel more comfortable and confident to ask questions online or privately, especially for introverted students. (1)
• The mobile learning app has good privacy, as students do not have to worry about being seen by others when asking questions or contacting teachers. (1)
• The mobile learning app makes it easy and fast to find course information, as students can stay updated on the course announcements and activities. (1)
• The mobile learning app has better design and usability, and compared favourably to another chatting app (D-card) in appearance and functionality. (1)

Disadvantages (number of times mentioned)
• The concern is that the mobile phone is out of battery, as students need to keep their phones charged to use the app. (1)
• The concern is that message notifications do not pop up, as students may miss important messages or announcements from teachers or classmates. (1)
• The concern is that the Zuvio app is only available in Chinese, which limits its accessibility and diversity for non-Chinese speakers. (1)
• The concern is that the Zuvio app does not support emojis, as it reduces the expressiveness and fun of the app for users who like to use emojis. (1)
• The concern is contacting absent classmates, which may enable cheating or dishonesty among students who attend or skip the roll call. (1)
• The concern is the Internet connection, as it depends on the speed and reliability of the Internet connection to function correctly. (1)
• The concern is that the Zuvio app cannot see other classmates' questions, preventing students from learning from each other's questions or discussions. (1)

- The concern is that the Zuvio app does not support re-calls, as it does not allow users to delete or edit their messages after sending them. (1)
- The concern is the roll call accuracy, which may need clarification or correction in the roll call process or results. (1)
- The concern is that it takes time to wait for answers, which may delay the feedback or communication between students and teachers. (1)
- The concern is that the mobile learning app may crash, which may cause technical problems or interruptions in its usage. (1)
- Students worry that it cannot use other software, as it may restrict the multitasking or flexibility of users who want to use other software during class. (1)
- Students are worried about needing to take notes by hand, as it may increase the workload or inconvenience users who prefer to take notes digitally. (1)

In summarizing students' qualitative feedback, as shown in Table 5, we systematically compiled students' perceptions of the strengths and weaknesses of the different digital tools as follows.

Some of the advantages of the four courses are similar in that they all involve the use of mobile learning tools (Zuvio or LINE) to facilitate communication, interaction, feedback, and engagement between teachers and students, as well as to provide convenience, flexibility and accessibility for learning activities and resources. Specific advantages are that some courses use Zuvio, which has more features and functions than LINE@, such as roll-call, to-do list, and upload area. In contrast, as mentioned in the introduction, some courses use LINE@, which is more popular and familiar to students than Zuvio.

Similarities in the disadvantages of the four courses include that they all involve various technical or operational issues with the mobile learning tools, such as the app crashing, message notification, and Internet connection, as well as other limitations or challenges for students, such as not being able to use other software, not seeing other students' questions, and not getting immediate replies outside class times. Specific disadvantages are that some courses use Zuvio, which has certain drawbacks and draws more complaints from students than LINE, such as not having an English version and not supporting emojis. However, most of these technical problems can be solved in a blended learning classroom because such digital technology is intended to be used as a complementary tool alongside traditional face-to-face teaching, and teachers can immediately increase students' confidence in using these digital tools in person. This differs from online distance learning, whereby teachers have to spend more time and energy worrying about the students' use of digital tools.

In conclusion, across the four courses both strengths and weaknesses were identified in using mobile learning tools to implement blended learning strategies. Teachers should consider their students' and courses' characteristics and needs when choosing and using the appropriate mobile learning tools. They should also provide clear guidance and support for students to overcome

potential difficulties and enhance their learning experiences. In addition to the quantitative and qualitative feedback mentioned above, researchers also collected the results of the anonymous evaluation of teaching and learning quality detected by our school, which is shown in Table 6 for reference. It clearly shows that in an anonymous and unbiased evaluation system, students highly rated their overall satisfaction with the courses.

Table 6: Evaluation of teaching and learning quality, as detected by our school

Course Title (Required/Elective course)	Average	Standard Deviation	Response Rate
Financial Markets (Elective)	4.7	0.47	92.59%
Finance Management (Elective)	4.5	0.7	87.72%
Financial Statement Analysis and Business Valuation (Required)	4.7	0.5	69.23%
Funds Management (Elective)	5	0.1	100%

*The evaluation uses a five-point Likert scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neutral," 4 = "Agree," and 5 = "Strongly Agree" with each statement.

The evaluation findings were organized and analysed according to the corresponding hypotheses, as shown below.

Table 7: Systematized findings and corresponding hypothesis confirmations

Findings	Reference Evidence	Hypothesis Confirmed
A blended learning strategy enhances students' class engagement and learning experience.	Table 3 Table 7	H1, H2, H5
A blended learning strategy statistically improves learning achievement. In particular, the strategic intervention will be positively perceived on elective courses.	Table 5	H3
Mobile learning makes class management more efficient.	4.2. Researchers' Observation	H4
Blended learning strategy helps promote knowledge-action integration and teacher-student interactions in and after class.	4.2. Researchers' Observation and Table 6	H2, H4
Blended learning with a proper platform or well-designed digital technology helps the class develop, in line with the instructors' teaching goals.	4.2. Researchers' Observation and Table 6	H1, H3, H4
Blended learning facilitates communication, interaction, feedback, and engagement between teachers and students and provides convenience, flexibility, and accessibility for learning activities and resources.	Table 6 and Table 7	H1~H5
Teachers should consider their students' and courses' characteristics and needs and use the appropriate mobile learning tools. They should also provide clear guidance and support for students to overcome potential difficulties and enhance their learning experiences.	Table 6 and Table 7	H2, H4, H5

It is hoped that students can leverage digital technology to improve their learning efficiency in class instead of letting it distract them and hinder their learning progress (Blackhow et al., 2009; Lersilp & Lersilp, 2019). Our study confirms that mobile learning allows students to learn by engaging in activities and 'doing' rather than simply listening to lectures or reading (Oliver & Trigwell, 2005). This strategy helps students to better understand and apply what they learn, thereby improving their learning outcomes (Barfi, 2023; Chang & Yeh, 2014; Lin et al., 2016). In this study, blended learning strategies were used to enhance students' classroom engagement and learning experience (Osguthorpe & Graham, 2003; Owston et al., 2013; Singh, 2003; Cheung, 2023). The use of social apps in the course will help to facilitate the integration of knowledge and action as well as teacher-student communication, interaction, feedback, and engagement, while also providing convenience, flexibility, and accessibility to learning activities and resources (Al-Ali, 2014; Chen et al., 2016; Cubeles & Riu, 2018; Wang, 2016; Zachos et al., 2018; Ali, 2023). However, our strategy is to conduct traditional physical courses rather than distance online courses, as many authors have discussed (Lersilp & Lersilp, 2019; Nazir & Brouwer, 2019; Tantalaki et al., 2019; Zachos et al., 2018). It is important to consider the characteristics of the students and use mobile apps to conduct multicourse comparisons with the same instructor and content to complement the lack of empirical studies, as pointed out by Kirschner and Karpinski (2010), Paul et al. (2012) and Zachos et al. (2018).

5. Conclusions
5.1. Conclusions and Implications
This study aimed to explore the impact of teaching strategies that combine mobile learning with traditional class methods in Finance curricula. Our research suggests that LINE@ and Zuvio significantly enhance students' class engagement, learning experience, and achievement in Finance curricula, as hypothesized. The process of blended learning is our study's most critical accomplishment, revealing a visionary teaching strategy in Finance curriculum design. It is anticipated that this will be widely applied in other disciplines to ensure high quality teaching in higher education. Especially since the COVID-19 pandemic, mobile learning, social community, and learning platforms have become essential. Our research demonstrated a blended learning model that emphasized the value of effective teacher-student interaction. Valuable social communication and human interaction were lost during the lockdown period of the pandemic. As recommended by UNESCO, digital technology should complement face-to-face classes with teachers, rather than replacing it. In addition, although instructors and students appreciated this teaching and learning practice model in general, the researchers observed that this kind of classroom interaction model was unfamiliar to some of the students. Its novelty might improve students' learning experiences initially. However, over time, students' willingness to participate might decrease due to the competing pressure of other activities and the need for test preparation towards the end of the semester. At the same time, a duplicated strategy could not draw their focus as at the beginning of the class. Therefore, continuously creating, enriching, and making the best use of social media and teaching activities through gamification

and digital resources will lead instructors in the right direction to reinvigorate the current classroom model. Finally, the most important principle is a sympathetic teaching strategy with a student-oriented curriculum design that takes account of learners' cognitive load.

5.2. Restrictions and Future Research
It was initially hoped that this study would crosscheck the practice observation among courses and track students' learning performance across different courses. However, only one student among the 106 students involved in the study had taken both of the two courses involved in this study, making the cross-subject effectiveness comparison impossible to complete, which is a limitation of this study.

Also, when this study was carried out in 2018, the COVID-19 pandemic was not predicted. We emphasized that mobile learning, combined with traditional classes and the above-mentioned technology, should support but never replace the human connections on which teaching and learning depend. Teachers should consider whether technology is appropriate for the learners' needs and use well-designed teaching strategies. However, as UNESCO uncertain about the effectiveness of adopting digital technology for education and learning, during the lockdown period, the strategic effectiveness of comprehensive distant online learning with social community apps and the results of this study needed to be re-examined. We look forward to the same instructors and courses of research being proposed in the future for comparing traditional classes with distant online courses through quasi-experimental design to determine whether there is a difference in the effectiveness of teaching strategy and learning achievement in mobile learning.

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