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Blended Learning for Secondary Schools in Nam Dinh Province to Satisfy New Standards:The Current Situation and Proposed Models

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ABSTRACT

We offered blended learning models for high schools in Nam Dinh province to satisfy Vietnam's new criteria. These models were based on general approaches to issues, theoretical research, and field research based on surveys and anket questionnaires conducted throughout the area. The results of a survey demonstrate that high school teachers in Nam Dinh have gained a fundamental grasp of blended learning and have, in practice, embraced both online and face-to-face instruction, particularly during the height of the Covid-19 outbreak. However, there was not a standard model for blended learning, therefore it was only used by a few persons. In other contexts, the concept of "blended learning" referred to what was effectively a face-to-face session that was broadcast over the Internet without the necessary adjustments being made to the content, methodology, or evaluation. As a result, we offer a number of different ways to blended learning for high schools in Nam Dinh in order to improve the quality of education provided throughout the province.

Keywords: blended learning, face-to-face learning, secondary education, gifted, high school

INTRODUCTION

Due to the impact of information technology and digital transformation, in recent years, traditional teaching methods in Vietnam have witnessed changes: the appearance of numerous learning-resource websites, highly interactive social networks, online learning, electronic learning, and multimedia learning. Among those, blended learning has been proven to be a suitable approach for students to improve self-learning and independence and become whole-life learners. Blended learning also enables students to acquire necessary skills for the 21st century and become competent workers for the future, in which information technology is crucial in almost all sectors (Ataberk & Mirici, 2022).

In 2018, the Ministry of Education and Training issued the General Educational Curriculum (Ministry of Education and Training, 2018) transformed from a content-based approach to developing students' competency. Blended learning suits such new orientation as it enables students to improve creativity and independence, proactively acquire knowledge, maximize their strengths, and customize their learning. Reviewing curricula used in high schools, we realized that blended learning could be applied to various subjects and activities.

According to the Department of Education and Training of Nam Dinh, all teachers have met or surpassed the criteria and are eager to diversify teaching models and methods, such as problem-solving and project-based learning. They have flexibly combined face-to-face learning and self-learning of students. Schools have applied Zoom meetings, Microsoft Teams, and Google Meet for online learning. However, both teachers and students are faced with difficulties due to substandard information infrastructure, slow internet connection, low enthusiasm from students, and limited interaction between teachers and students.

Document 1061/BGDĐT-GDTrH (Ministry of Education and Training, 2020) outlined guidance for online learning and education broadcast on television throughout the time students studied from home due to the Covid-19 pandemic in the school year 2019–2020: In online learning, teachers adopted applications or services available on the Internet to give courses, to test and assess student. Online learning includes: (1) Teaching and learning through a Learning Management System (LMS). (2) Teaching and learning through a Learning Content Management System (LCMS). (3) Teaching and Learning through online learning systems. Online learning in Nam Dinh has only met these criteria, while LMS and LCMS are essential. Furthermore, online learning in Nam Dinh was just a combination of online and face-to-face learning and, in some cases, was a face-to-face session

broadcast online. Online learning in Nam Dinh remains inefficient without a concrete model or is systematically applied.
As a result, we have conducted scientific research for blended learning in Nam Dinh and proposed blended learning models for high schools in this province. This research is part of the provincial project.

Blended learning definition

Blended learning is not a new term, it has been studied for decades, but its definition is still quite broad.
Oliver and Trigwell (2005) proposed three different definitions of blended learning: (i) "The combination of media and tools employed in an e-learning environment"; (ii) "The combination of many pedagogic approaches, irrespective of the learning technology used"; (iii) "The integrated combination of traditional learning with web-based online approaches." In a 2005 workshop on blended learning funded by the Alfred P. Sloan Foundation, the participants came up with a narrower definition. They described blended learning courses as Courses that integrate online with traditional face-to-face class activities in a planned, pedagogically valuable manner. A portion (institutionally defined) of face-to-face time is replaced by online activity (Picciano, 2009).
In a more focused way, Bliuc et al. (2007) gave the following definition: Blended learning describes learning activities that involve a systematic combination of co-present (face to face) interactions and technologically mediated interactions between students, teachers, and learning resources. Garrison and Kanuka gave a similar definition, where they defined blended learning as the thoughtful integration of classroom face-to-face learning experiences with online experiences (Garrison & Kanuka, 2004).
The same opinion as above, but the definition of Staker and Horn (2012) is more detailed and stricter: "Blended learning is a formal education program in which a student learns at least in part through online delivery of content and instruction with some elements of students control over time, place, path, or pace and at least in part at a supervised brick-and-mortar location away from home". The essential thing in common between various concepts is students' exposure to online and face-to-face learning, so these two forms can connect and supplement each other.
In this research, blended learning is defined as real-time interactive learning delivered online or face to face, combined with assignments of homework or projects for students to conduct through a website or a learning management platform.

Blended learning model

The taxonomy of blended learning models varies with different approaches. The taxonomy by Staker and Horn (2012) illustrated below is most widely agreed upon and cited:

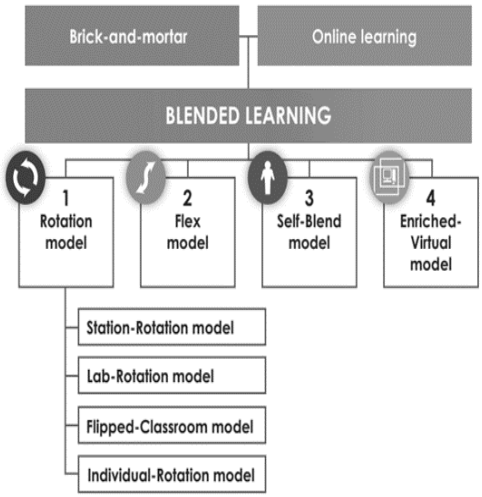

Figure 1. Blended learning taxonomy

In addition, Horn and Staker (2011) mentioned another model, the Face-to-Face Driver mode.
Based on sub-models and schemes for blended learning which have been applied, Nguyen et al. (2020) has chosen and diagrammed some schemes for blended learning as follows:

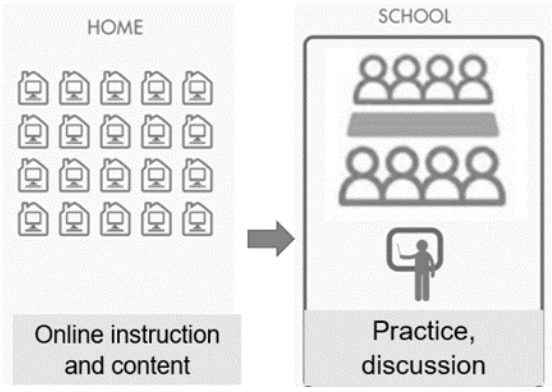

Figure 2. Flipped classroom

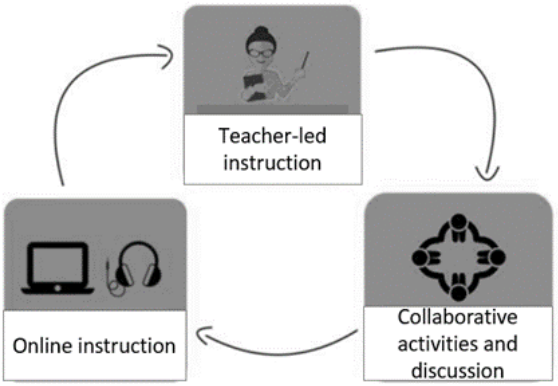

Figure 3. Station rotation model suitable for blended learning

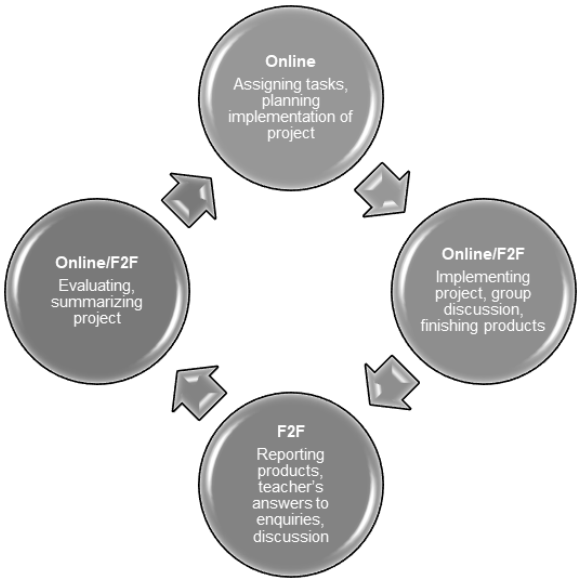

Figure 4. Project-based learning in blended learning

Dang analyzed the possibility of applying two forms of blended learning at boarding schools for ethnic students in Thai Nguyen province: One entire session is delivered online, and one session is delivered with a combination of online and face-to-face learning (Dang, 2015).

As for the structure of the blended learning model, Carman (2005) proposed one shown in the following figure:

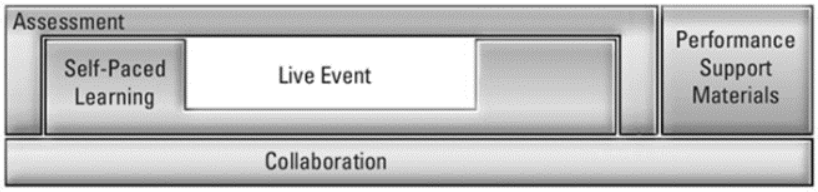

Figure 5. Five ingredients for blended learning

By examining different processes of designing blended learning courses, Alammary et al. (2014) identified three distinct design approaches: (i) Low-impact blend: adding extra activities to an existing course; (ii) Medium-impact blend: replacing activities in an existing course; (iii) High-impact blend: building the blended course from scratch. Corresponding to the above design approaches, there are three blended learning degrees. Level 1, face-to-face learning has a dominant role, while online learning is delivered through web -based self-learning with teachers' instructions. Level 2, face-to-face learning consists of experiments, experiences, discussion, and Q&A, while online learning focuses on self-learning (study learning content, test, assessment, discussion in a virtual class.). Level 3 is a systematic application of Level 2, including tests and assessments conforming to the requirements of the whole course.

As for gifted schools or gifted students, blended learning is a choice for advanced countries like Singapore, the United States, the United Kingdom, or Australia, as its advantages boost potential and meet the demands of those students. Well aware of self-study, gifted students often select optional courses suitable for their strengths. In Viet Nam, blended learning has just been taught as a subject for theoretical study and has been applied on a minimal scale in high school education. Some blended learning projects have only introduced the application of information technology in teaching. Researches fail to pay attention to test and assessment or utilize data relevant to students' online activities or achievements to improve face-to-face learning. This is also a failure to apply a blended learning model essentially. Furthermore, researchers have been analyzing customization inadequately in learning, although this constitutes a prominent advantage of blended learning that requires further study and more practical application (Bani-Amer, 2022). Blended learning is also new to Nam Dinh, without any research on this issue in the province.

We acknowledge that many researchers have analyzed concepts, components, and their implementation in several countries. However, these researches do not propose any models for blended learning nor their implementation in any locality of Viet Nam. Therefore, this research suggests that a blended learning model improves teaching and learning in high school education in Nam Dinh province.

METHODS

Participants

2.768 students took part in the surveys, of which 35.4 percent were boys and 64.6 percent were girls. Students in grades 10, 11, and 12 account for 36.5 percent, 35.9 percent, and 27.6 percent. Regular and gifted students account for 52.7 and 47.3 percent, respectively.

Twenty-eight management officials and 334 teachers took part in the surveys, of which 28.5 percent were male, and 71.5 percent were female. Teachers with over 15 years of teaching experience are the biggest group (44 percent). Those with over ten years of experience account for 80.7 percent for both management officials and teachers, while those with less than five years of experience account for only 4.1 percent. Most management officials and teachers have bachelor's degrees (68.5 percent), and only one has a degree of associate. Among management officials, 64.2 percent have worked for 5 to 15 years, and two have worked for over 15 years (7.1 percent).

Measurement

Surveys were conducted in 7 high schools in Nam Dinh province, Vietnam, with the participation of 28 management officials, 334 teachers, and 2.768 students. The surveys create a premise for building blended learning models for high schools in this province.

Objectives of the surveys: (i) to evaluate the knowledge, interpretation, and readiness of management officials and teachers in Nam Dinh for blended learning; (ii) to assess reality and conditions for blended learning, as well as necessary training for management officials and teachers to implement blended learning.

The surveys used three questionnaires for students, teachers, and management officials. Questions were based on blended learning and online learning, such as awareness of management officials and teachers, learning content, media, and methods; infrastructure and resources; teaching implementation; teacher-student interaction; test and assessment.

Data Analysis

All collected data was verified, arranged, and coded. Afterward, all data was packed in a single file for processing in the next phase. The principal processing method is as follows:

- Running the Cronbach Alpha coefficient to check the reliability of the scale. The internal consistency method assesses the scale's reliability through the Cronbach Alpha coefficient. The value of Cronbach's alpha coefficient from 0.6 and above can be used if the research concept is new or new in the research context (Hoang & Chu-Nguyen, 2008).
- Utilizing descriptive statistics to get an overview of applying the blended learning model and competency-based learning in line with General Educational Curriculum 2018 according to respondents and schools.
- Calculate the percentage: for yes/no questions or choose between 2 options; or level assessment questions.
- Average score: for questions on the 5-point Likert scale, scores will be assigned from 1 (totally no response/no participation) to 5 (excellent response/widespread participation), then calculate the average score. This average score gives us the best overview of trends in the data. Then the meaning of each mean value for the Interval Scale will be determined as follows:

Distance value = (Maximum - Minimum)/n = (5 - 1)/5 = .8

RESULTS

Perception of management officials and teachers about blended learning

Opinions of management officials and teachers about blended learning

Diagram 1 indicates that despite differences in degree, most management officials and teachers are fully aware of blended learning. 86.7 percent of management officials and 60.8 percent of teachers define blended learning as "real-time online learning delivered through applications such as Zoom, Google Meet, MS Teams, or as face-to-face learning combined with assigning tasks for students to conduct self-study and self-evaluation on a website or a learning management platform."

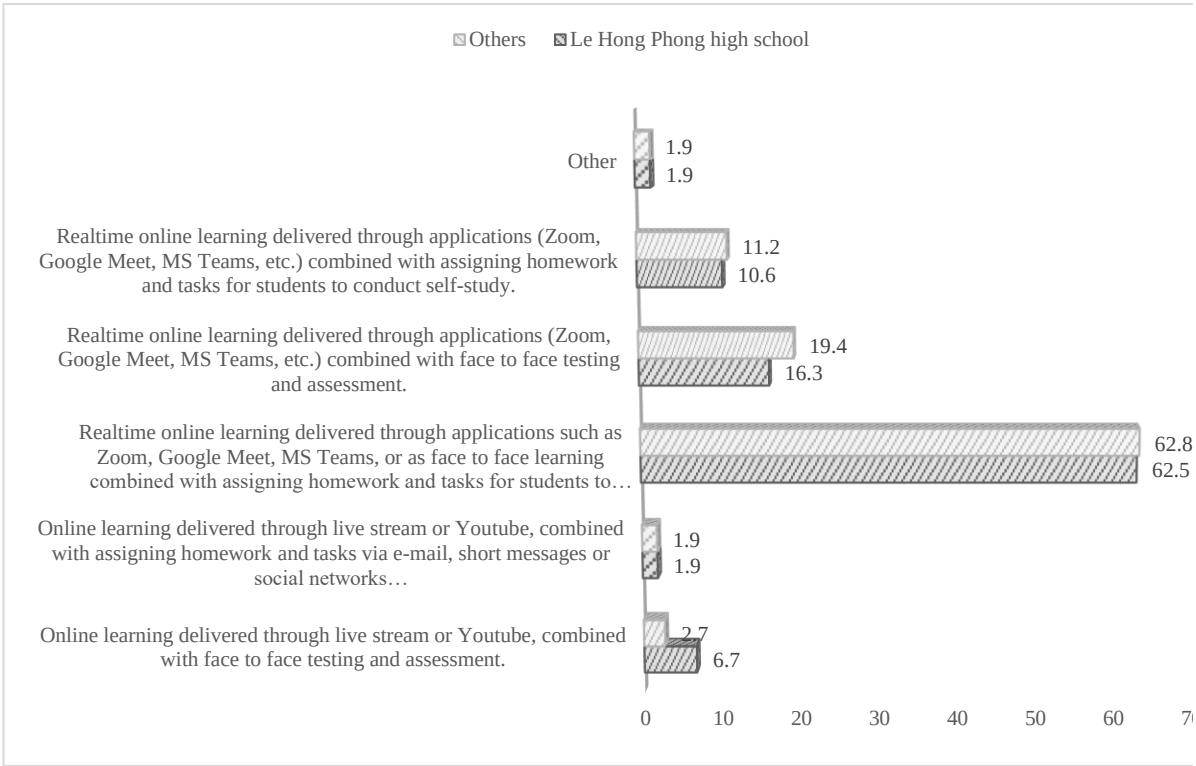

Diagram 1. Opinions of management officials and teachers about blended learning

That definition most fully describes the features of blended learning. Accordingly, online learning can be delivered through an LMS in which teachers provide learning resources in a planned method to instruct, control, manage, and monitor students' learning activities. Meanwhile, face-to-face learning can still be conducted or 'transformed' into synchronous online sessions in the light of obstacles like the outbreak of the Covid-19 pandemic.

Blended learning boosts the advantages while dealing with the disadvantages of face-to-face and online learning. For successful implementation of blended learning, it is crucial to pay attention to improve awareness of management officials and teachers about such advantages and disadvantages.

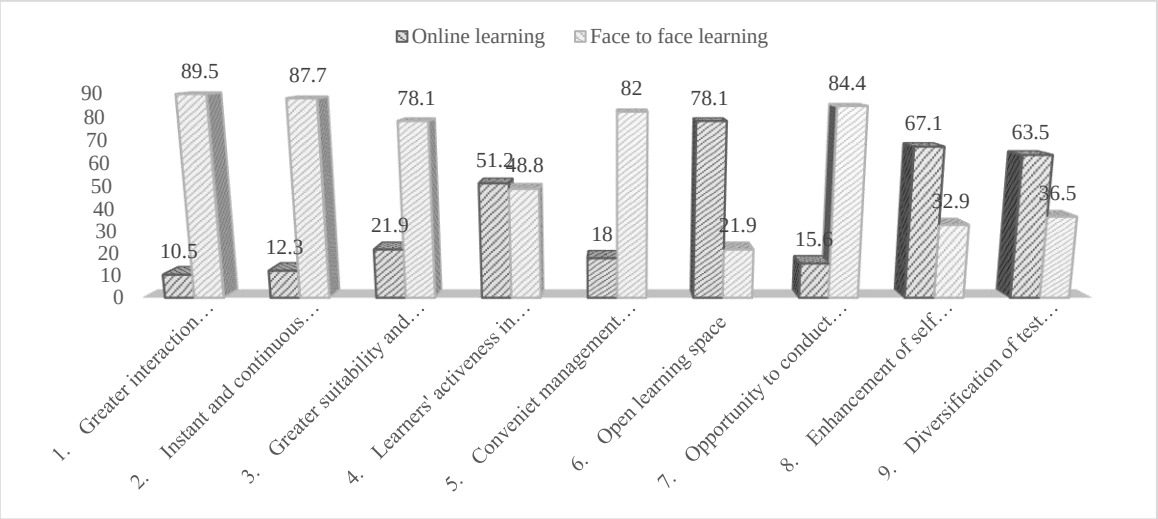

Diagram 2. Teachers' opinions about the advantages of face to face learning and online learning

As for online learning management, officials and teachers appreciate Open learning space (78.1 percent), Enhancement of self-study and information acquisition (67.1 percent), and Diversification of student evaluation tools (63.5 percent). They also acknowledge the benefits of face to face learning: Higher interaction between teachers and students and among students (89.5 percent), Continuous and instant interaction between teachers and students and among students (87.7 percent), and the Opportunity to conduct experiments and have real-life experiences (84.4 percent), Opportunity to easily keep track of teaching quality (82 percent), Being suitable and effective with all age groups (78.1 percent). As for 'Learner's activeness in absorbing knowledge, 48.8 percent view it as an advantage of online learning, while 51.2 percent attribute it to face-to-face learning. Furthermore, as for the 'Opportunity to easily keep track of teaching quality,' face-to-face learning is considered far superior to online learning.

As for 'Being suitable and effective with all age groups, ' face-to-face learning enjoys a much higher rating (78.1 percent against 21.9 percent). This makes sense from teachers' perspectives, for they can flexibly adapt to learners' requirements and learning conditions. However, when learning content, learning methods, and learners' customization are taken into account, online learning is considered much better. This result is from the fact that face-to-face learning is fixed in terms of place and duration, and learning content and resources are provided to students simultaneously.

Readiness of management officials and teachers for blended learning

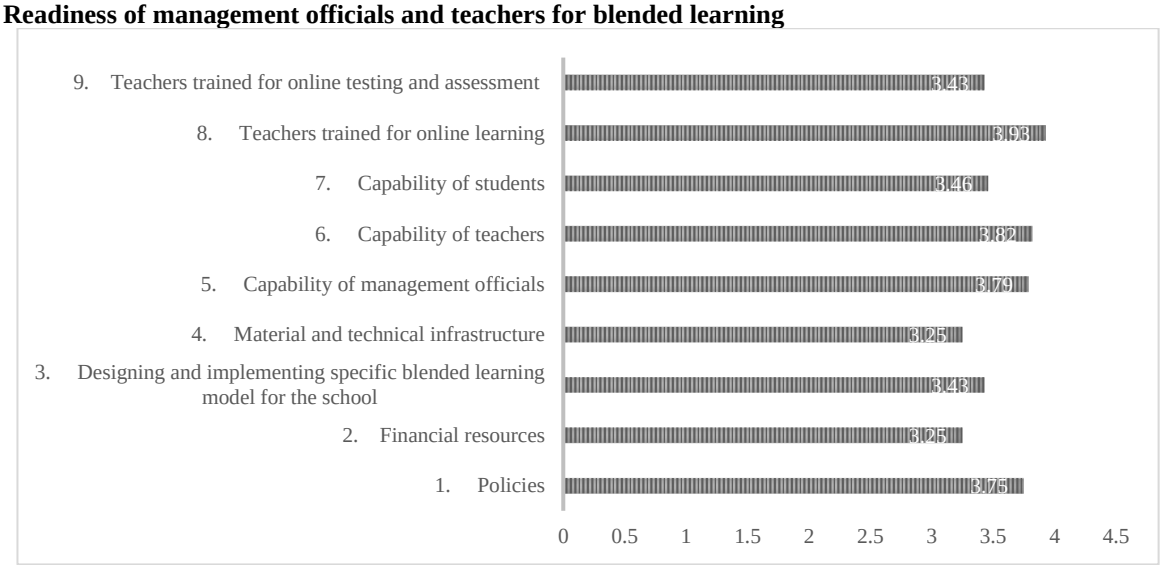

Diagram 3. Readiness of schools for blended learning

Responses from management officials indicate high readiness of schools for most aspects (Diagram 3, average scores vary from 3.25 to 3.93). The highest readiness comes from 'training teachers for blended learning,' followed by 'capability of teachers' and 'capability of management officials.' The lowest readiness comes with 'financial resources' and 'Material and technical infrastructure.' The surveys show that schools have specific preparations for blended learning and digital transformation in education.

The high readiness of management officials constitutes a favorable condition for implementing blended learning in surveyed schools. As for teachers, they are also highly ready to take part in blended learning once introduced (Diagram 4).

Analysis based on subjects and teaching experiences indicated varied readiness for blended learning. Teachers of science subjects are more ready than fellow teachers of social science subjects, which is a statistically significant difference (Sig. = .041). As a result, teachers of social science subjects need more assistance from schools and colleagues when implementing blended learning. Teachers with 5 to 15 years of teaching experience are more ready to take part in training and building models for blended learning than other groups, which is a statistically significant difference (Sig. = .007). This is a positive sign and indicates that this group is crucial to successfully implementing blended learning in schools.

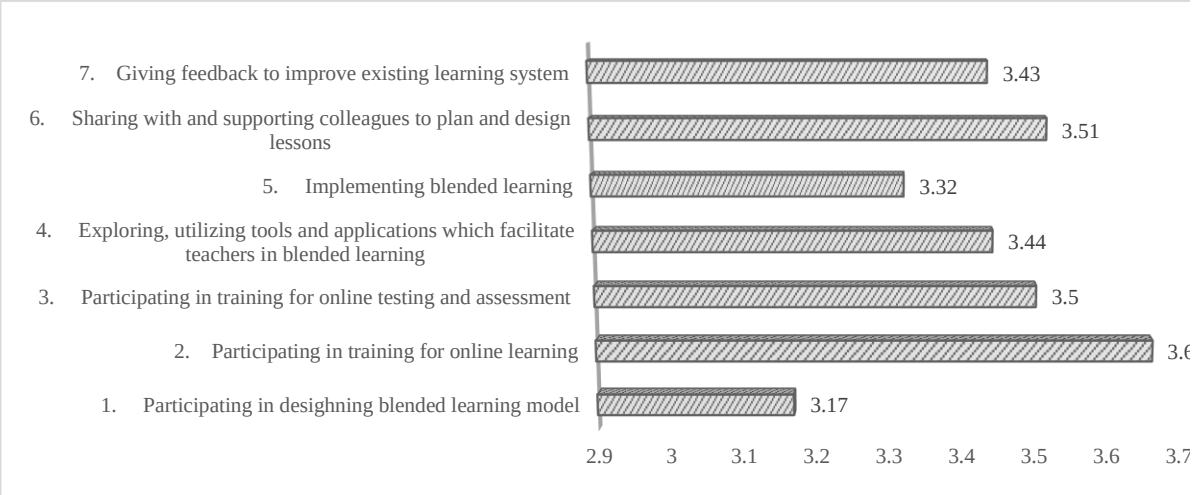

Diagram 4. Readiness of teachers for blended learning implementation

Implementation of blended learning

In reality, blended learning is still new to Viet Nam and unfamiliar to schools. Nevertheless, due to digital transformation and the covid-19 pandemic, blended learning has been adopted and has become more popular recently. Therefore, we conducted surveys on online learning as part of blended learning to grasp the needs and conditions for future implementation of blended learning.

Time allocated for delivering and managing online learning

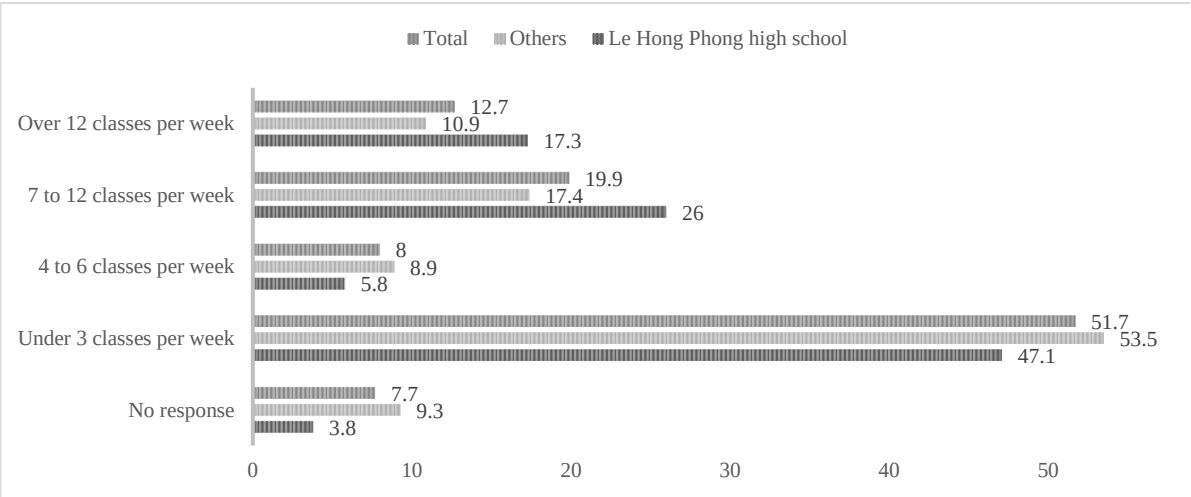

Diagram 5. Teacher's average time allocated for online learning (each class lasts for 45 minutes)

54.4 percent of management officials and teachers have delivered and managed online learning for 3 to 5 years, 38.1 percent for less than one year, 6.9 percent for over five years, and only 6.0 percent for between 1 to 2 years. This proves that online learning was adopted before the outbreak of the Covid-19 pandemic; it was implemented not due to this pandemic but due to the need to improve teaching quality.
As for teachers, 51.7 percent deliver online learning in less than three classes per week. Online learning requires them to pay more time interacting with students, monitoring their participation, and assessing their progress. Therefore, it is necessary to deliver fewer online learning classes than face-to-face classes. Results of the surveys indicated that most teachers deliver 3 to 6 classes per week, which is suitable for effective online learning without creating professional pressure for teachers. (See Diagram 5)

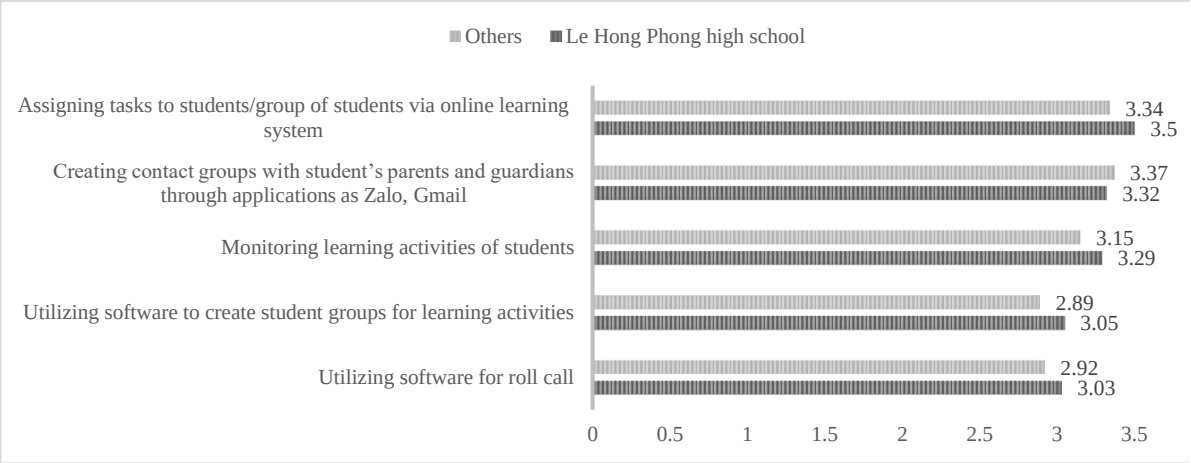

Diagram 6. Frequency of teacher's adoption of tools to monitor student's learning activities

Teachers need to manage learning, especially online, where teachers and students do not meet in person. Therefore, how teachers manage students' learning activities that require attention. In general, teachers' organization and management of learning activities reach level 3 out of 5 levels for frequency. Diagram 6 shows that Assigning tasks to students/groups of students via an online learning system is most frequently conducted (with an average of 3.5 for Le Hong Phong school and 3.34 for others). That is followed by Creating contact groups with students' parents and guardians through applications such as Zalo and Gmail. The lowest score comes with Utilizing the software to create student groups for learning activities (with an average of 3.05 for Le Hong Phong school and 2.89 for others).
Learning resources are essential for successful blended learning, of which diversity and frequency of use are important indicators. Diagram 7 depicts survey results on digital learning resources and frequency of use. Teachers most frequently utilize resources in the form of digital documents (with an average of 3.76 for Le Hong Phong school and 3.65 for others - level 4), followed by digital images (with an average of 3.39 for Le Hong Phong school and of 3.09 for others - level 3), digital banks for examinations/assessment tests (with an average of 3.22 for Le Hong Phong school and of 3.09 for others - level 3). The least frequently used modeling/experimenting software is not used for teaching all subjects.

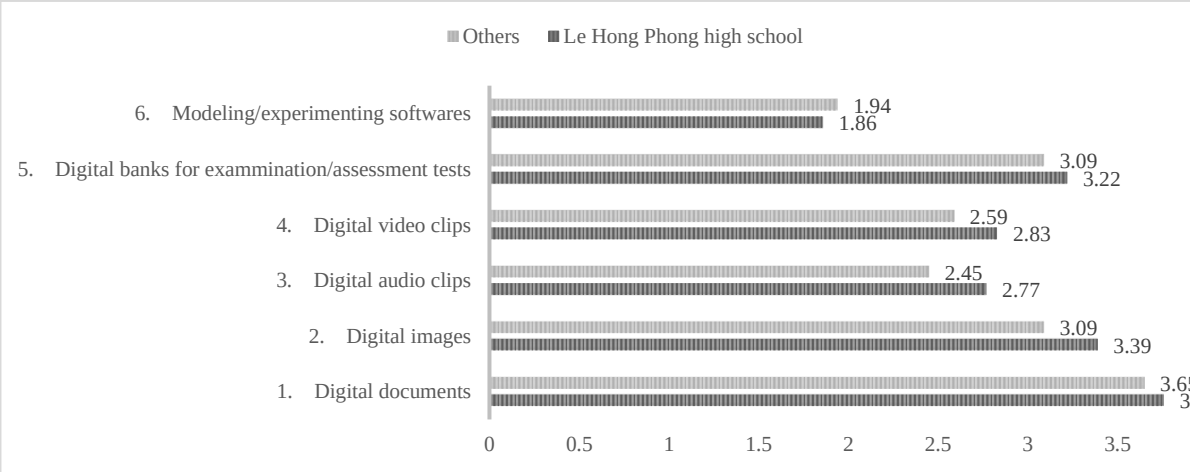

Diagram 7. Learning resources utilized by teachers

The results are consistent that the most common learning resource in schools is documents and digital banks for examination/assessment tests. They are principal resources used for face-to-face learning and continue to be adopted for learning online. Learning resources in the form of videos remain scarce; most of them are collected by teachers, and just a few schools can produce this type of resource. Hence for the successful implementation of blended learning, it is necessary to plan and prepare personnel and equipment to meet the requirements for videos as the primary learning resource.

Teaching skills of teachers

The teaching skills of teachers are evaluated from several aspects, such as delivering online learning, exploring and utilizing learning resources, etc. Questions for self-evaluation of teachers' skills in online learning are highly reliable. See results in Diagram 8.

All skills evaluated by teachers are at level 3 (average scores ranging from 2.75 to 3.24). IT skill has the highest score (average score of 3.24), followed by Exploring and utilizing resources for online learning (average score of 3.06), Tests and Assessment in online learning (average score of 3.03) while Building a unique style in online learning has the lowest score (average score of 2.75). These skills are necessary for the successful implementation of blended learning in schools. Therefore, shortly, teachers need further training.

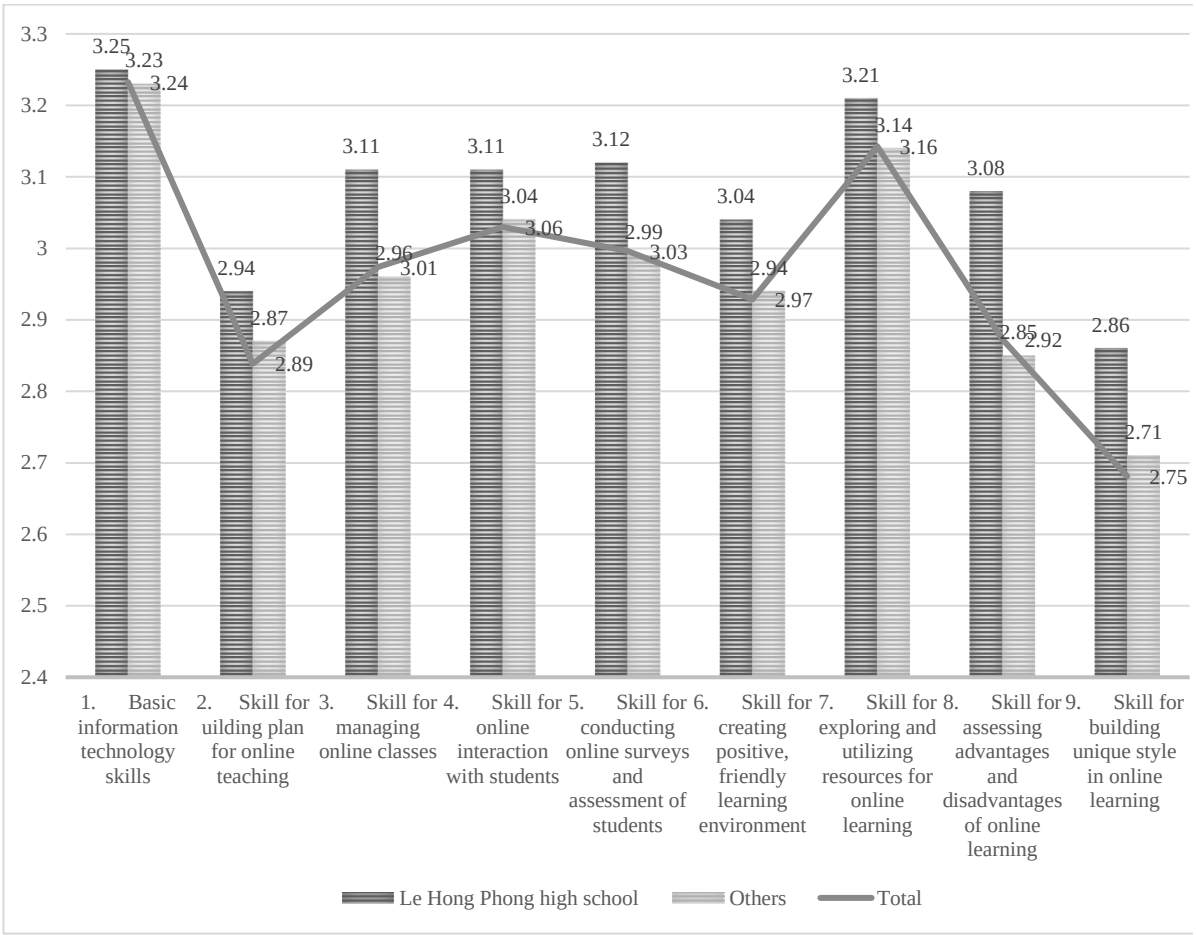

Diagram 8. Self-evaluation of teachers' skills in online learning

Regarding the level of activities implementation for blended learning, teachers consider compiling Powerpoint presentations as the best skill (level 4). Other activities are evaluated to achieve level 3: Establishing groups for online and face-to-face learning, Managing online learning classes, and Utilizing online learning resources to prepare face-to-face and online testing and assessment. See results in Diagram 9.

Activities evaluated by teachers as skills of low level include Editing audio recording files (average score of 1.67 – level 1), Applying LMS (average score of 1.77 – level 2), Editing video recording files (average score of 1.84 – level 2), Compiling digital learning resources (average score of 1.91 – level 2), Building plan for online teaching (average score of 1.93 – level 2). This may be due to the unfamiliarity of LMS to the teachers. In addition, traditional teaching does not require many digital learning materials, which does not encourage teachers to master relevant skills. The results indicated a learning resource production system that facilitates teachers in blended learning, and they also need training and support to use LMS and LCMS.

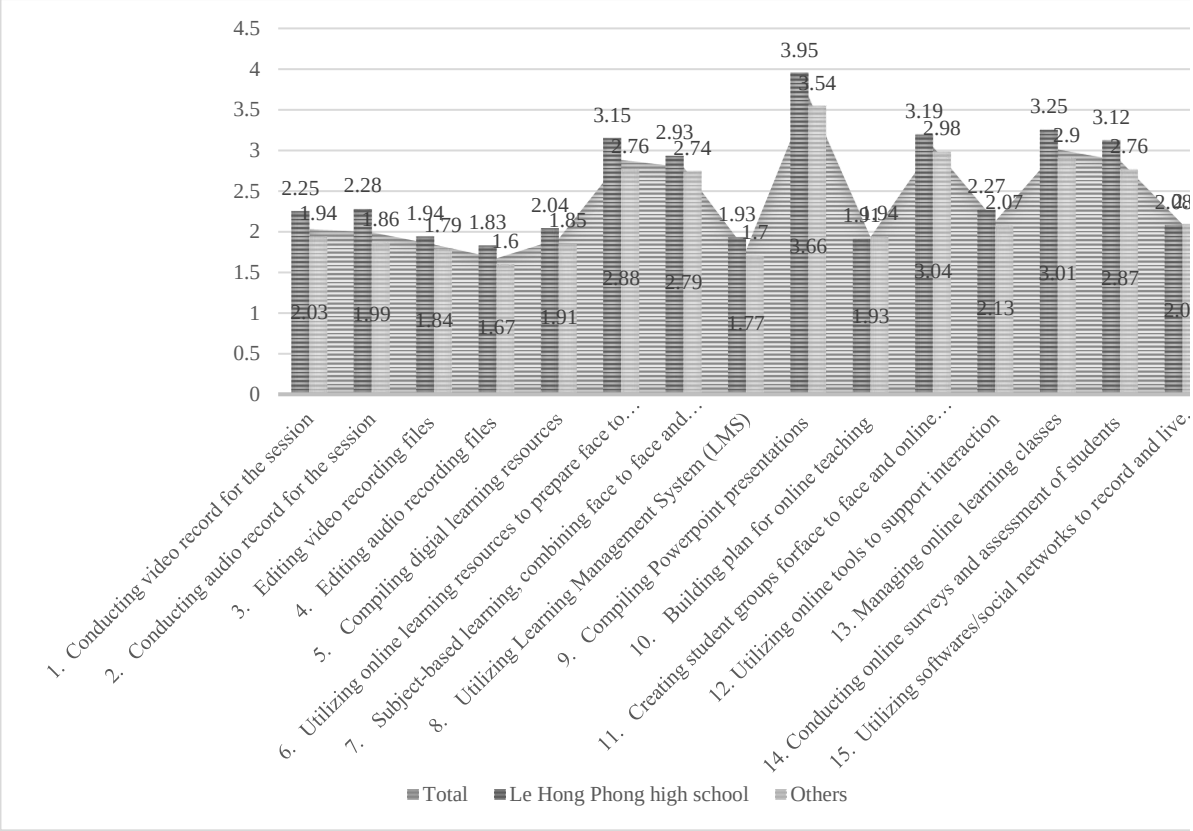

Diagram 9. Frequency of teachers' activities to combine online and face to face learning

Teaching tools

Various tools can facilitate teachers' work, but the surveys showed that they focus on certain ones. Many tools are rarely used or even unknown to teachers. Teachers mainly use free software and tools; perhaps the software cost is the biggest hurdle for teachers' access to them.

Applications more frequently used by teachers are Zoom, Google Meet, Microsoft Teams, Zalo, Facebook, and Messenger, which are free of charge. As a result, it is necessary to consider financing learning applications in implementing blended learning. In addition popularity of applications varies with the schools: teachers in Le Hong Phong school mostly use Microsoft Teams while their fellows make more use of Zoom and Google.

A difficulty for teachers to deliver blended learning comes from Tools for students' online learning (with an average score of 3.19), Supporting resources, Organizing and managing online classes, Equipment for building learning content, Designing learning activities, Internet transmission speed, Changing teaching habits, Selecting teaching content, Information technology skills. (See Diagram 10)

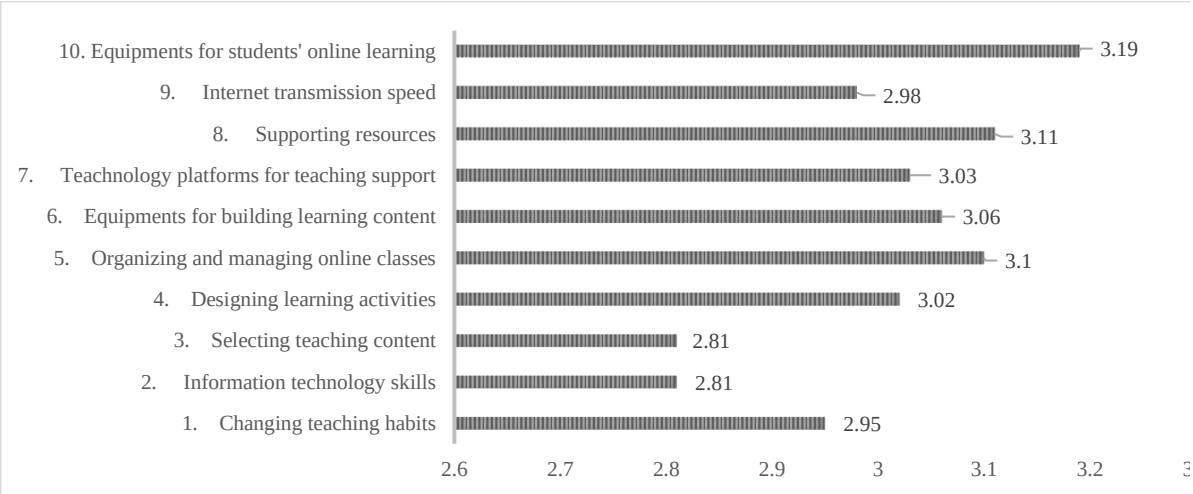

Diagram 10. Degree of difficulties faced by teachers in delivering online learning

Meeting requirements for blended learning

Meeting requirements for blended learning are illustrated in Diagram 11. Accordingly, management officials and teachers appraise policies and mechanisms facilitating blended learning: Instructions and guidelines of various levels, School policies for online and face-to-face learning, and Mechanism and management of the school. In addition, computers, projectors, and networks enjoy a good rating (with an average score ranging from 3.26 to 3.37 - level 3). Studio, equipment, and budget come with the lowest scores.

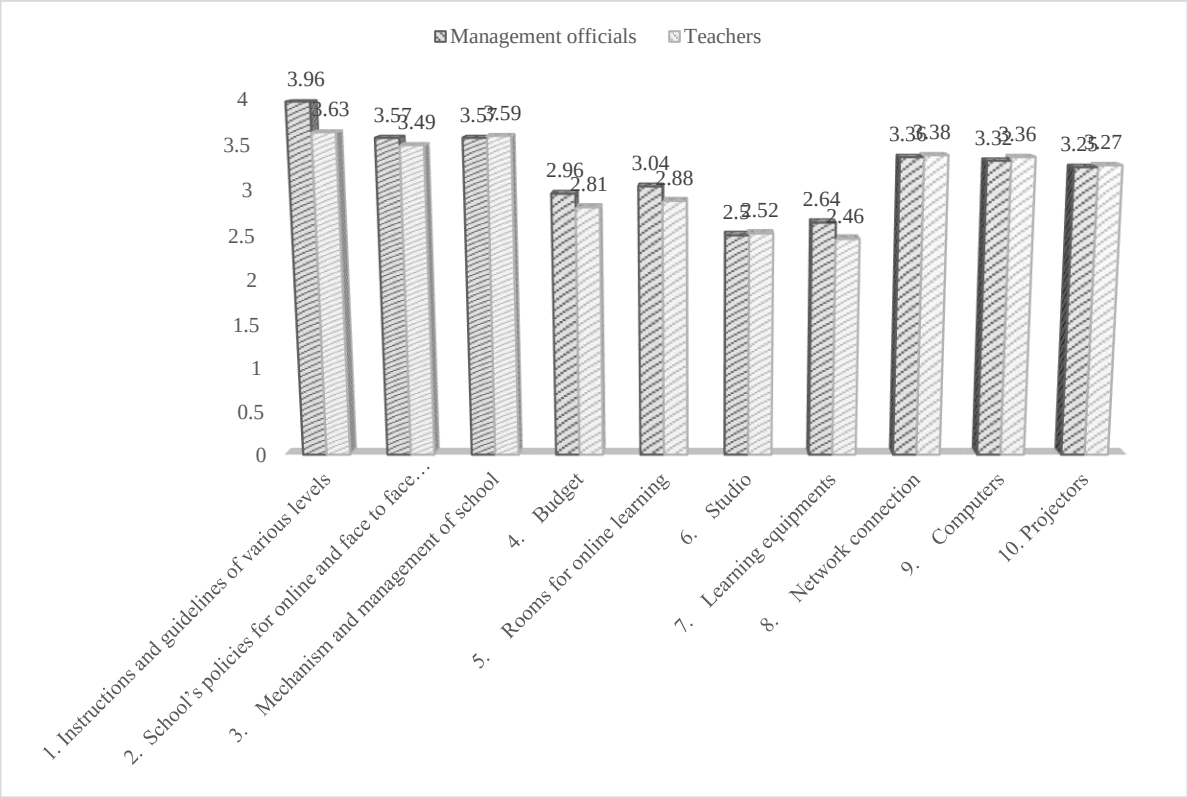

Diagram 11. Meeting requirements for blended learning

Feasibility of blended learning models, from a student's perspective

The activeness of students in online learning

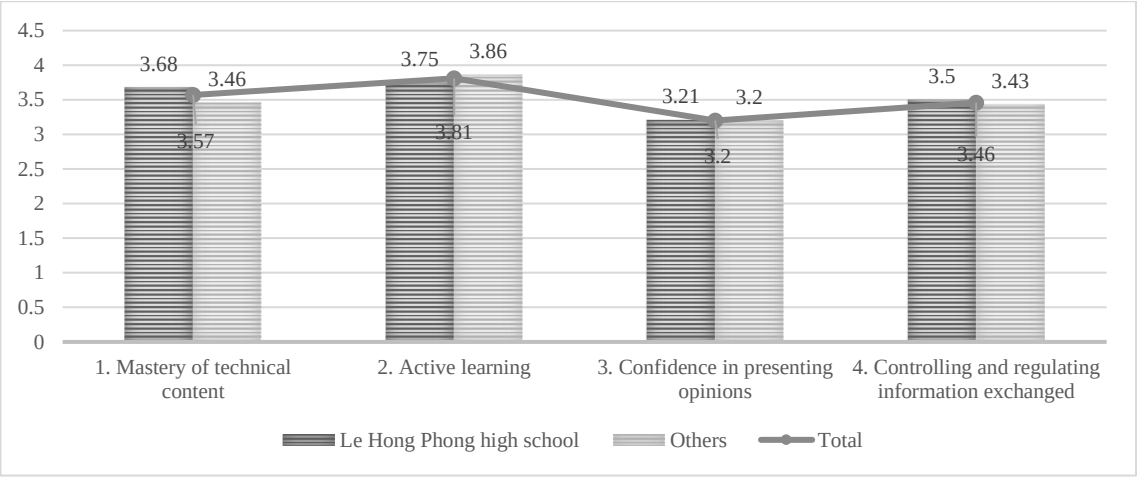

Diagram 12. Self-evaluation of students' activeness in online learning

Diagram 12 indicates students' self-evaluation of activeness in online learning. Accordingly, most indicators score over 3.4 (level 4): Mastery of technical content, Active learning, Controlling and regulating information exchanged. Those indicators score between 3.2 (level 3) and 3.81 (level 4). Self-evaluation of students in Le Hong

Phong and other schools have much in common: The highest score comes with active learning, while the lowest score comes with a lack of confidence in presenting their opinions.

Student's opinions about the advantages and disadvantages of online learning

Students' opinions about the advantages and challenges of online learning are shown in Diagrams 13 and 14. Internet access from home is considered the most considerable advantage, but it also poses the most significant challenge due to unstable connections. The second biggest challenge comes from the inability to interact with teachers and other students. Three factors posing fewer challenges to students include Inadequate learning equipment, Having to share learning equipment with others, and difficulty following online classes due to unfamiliarity with online learning. Survey results are similar in Le Hong Phong and other schools.

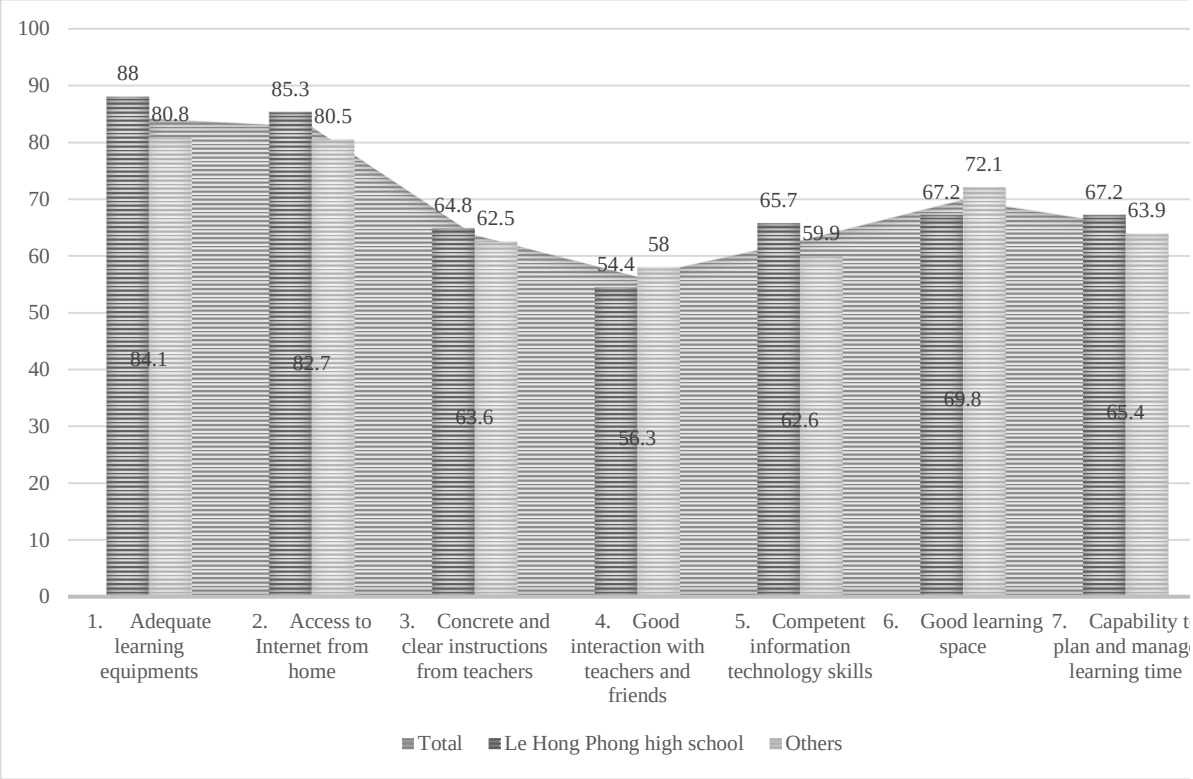

Diagram 13. Student's opinions about the advantages of online learning

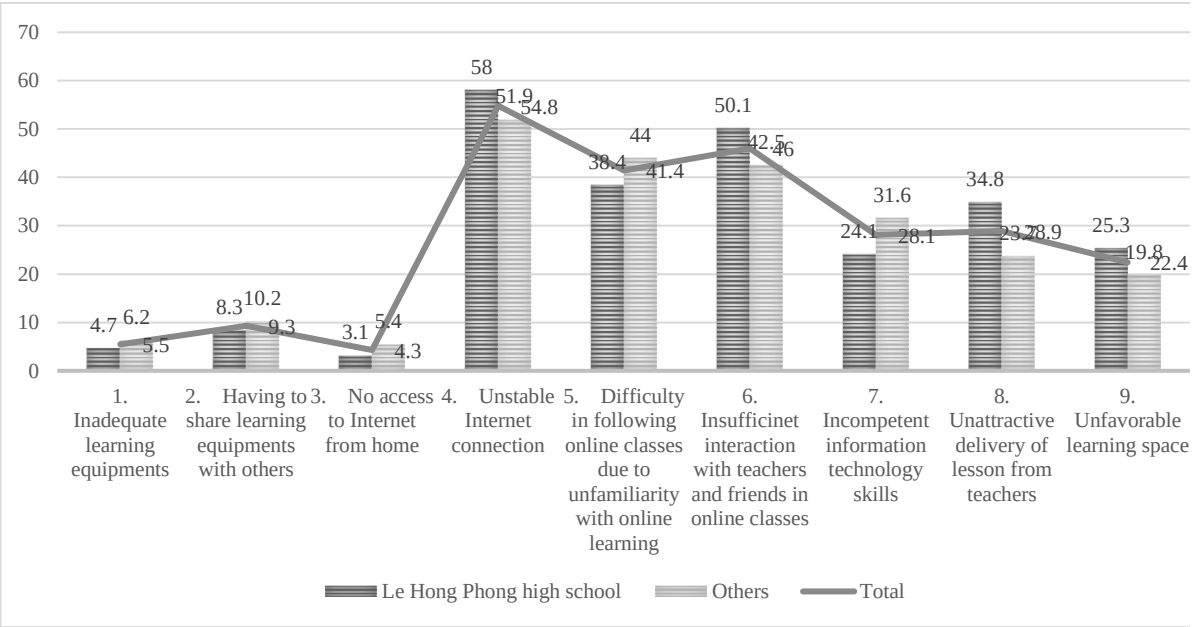

Diagram 14. Student's opinions about the disadvantages of online learning

Tools used by students for online learning

Students' evaluation of tools used for online learning is as follows:

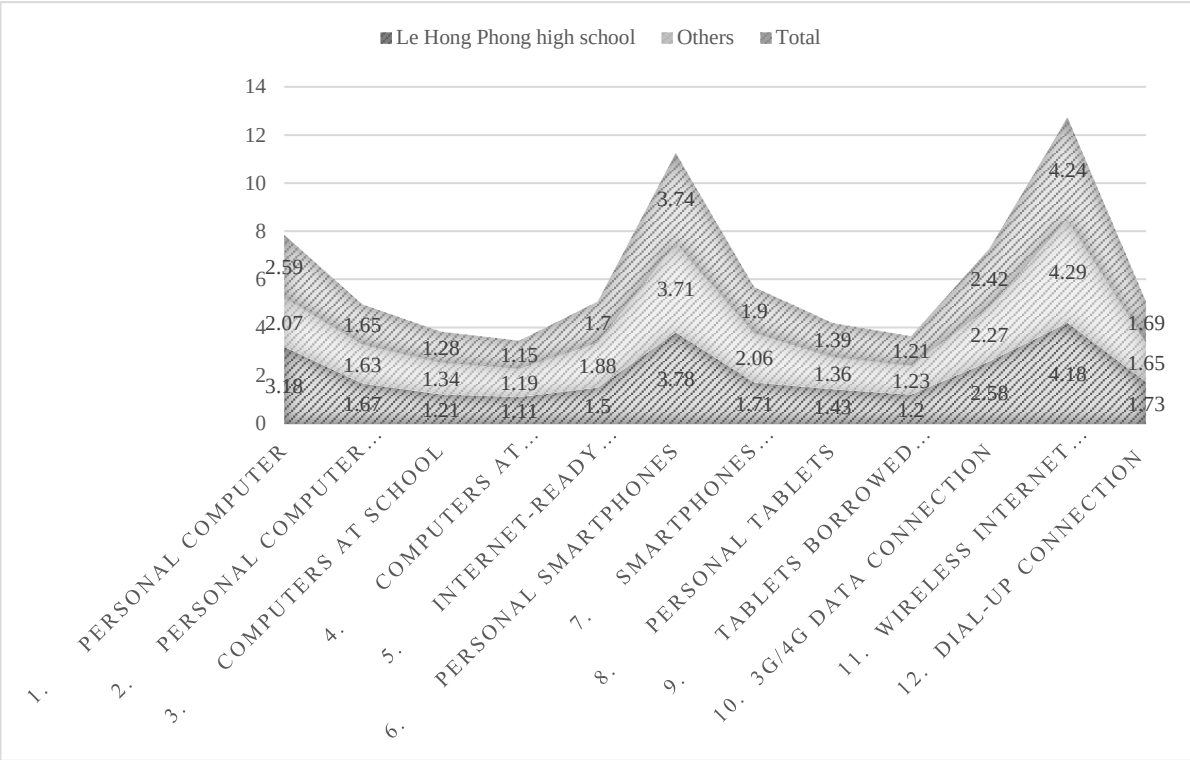

Diagram 15. Frequency of using tools for online learning

Wireless internet connection is most frequently used, followed by data service (3G/4G), and the dial-up connection is very rarely used. The availability of wireless internet connection constitutes a favorable condition for implementing online and blended learning.

The most common equipment that has been used for online learning is personal smartphones, followed by the personal computer and smartphones of relatives. Smartphones can be utilized as online learning equipment for a short period, such as during the outbreak of the covid-19 pandemic and should not be adopted for long-term online learning. Schools need to give warning about this and acquire equipment suitable for students. During the outbreak of the Covid-19, most students studied from home, and they did not use the school's computers. Students rarely use the Internet connection of schools or Internet-service shops proves that Internet access is top-rated in households. This is very favorable for the implementation of online and blended learning.

Proposal of blended-learning models for high schools

Feasibility of implementing blended learning models in high schools

In the light of the 4th Industrial Revolution, the education sector has actively adopted solutions and tasks to enhance information technology to facilitate management, teaching, learning, test and assessment, and research, resulting in positive achievements. Since the outbreak of the Covid-19 pandemic, schools, and management agencies have been urged to boost online learning.

Contributors to this research hold that it is feasible to implement blended learning models in Viet Nam high schools, especially 'Online learning in support of face to face learning' and 'online learning replacing partial face to face learning,' which have been instructed by the Ministry of Education and Training in the Circular for Regulations of online learning in public schools (Ministry of Education and Training, 2021). We must have a roadmap to ensure the implementation conditions regarding facilities, technology platforms, LMS, LCMS, learning materials, resources, and human resources.

Some possible blended learning models for implementation in high schools
Parallel support, model 1: face-to-face driver

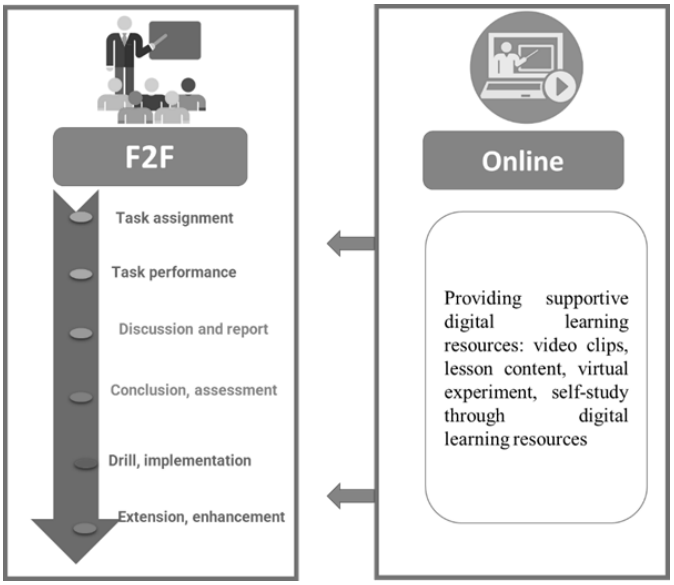

Figure 6. Parallel support, model 1: face-to-face driver

Characteristics of the model: face-to-face learning has a dominant role, with one part replaced by online learning. Learning content/topic is redesigned when delivered through online learning; time allocation depends on regulations for delivering the subject through face-to-face learning. Formative assessment is carried out during face-to-face learning. Online learning is considered a parallel and complementary activity in which teachers actively design learning activities in the form of an integrated online learning experience.
Preparation for infrastructure: rooms and necessary tools need to meet minimum requirements for face-to-face learning. Essential requirements include Internet access and a Computer laboratory, Special learning rooms, and multimedia rooms equipped with information technology appliances that enable face-to-face learning and home-based learning.
As a result, management for teaching and learning does not differ much from traditional education. This model can serve as a transition to gradually introduce teachers and students to blended learning.

Parallel support, model 2: online driver

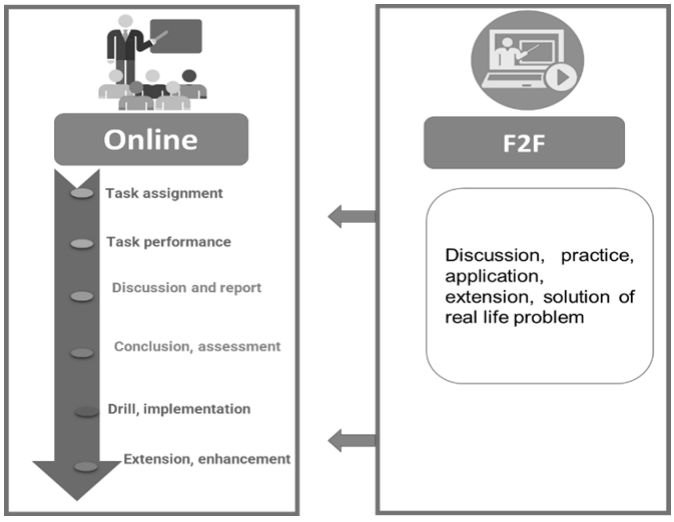

Figure 7. Parallel support, model 2: online driver

Characteristics of the model: online learning has a dominant role, with specific activities delivered through online learning: discussion, practice, application, extension, experience, and real-life problem-solving.

Learning content/topic is redesigned to suit online learning, time allocation is flexible (partly depends on regulations in the teaching plan), and tests and assessments are conducted through online and face-to-face learning. Face-to-face learning is conducted in parallel and in support of online learning, in the form of discussion and experience to deal with real-life and unsolved problems in online learning. This model combines active learning such as subject-learning, project learning, flipped classroom, etc. Teachers are required to be capable of information technology skills and online learning.
Preparation for infrastructure: Essential requirements include: Internet access; servers for storage and local network; Computer laboratory; Special learning rooms and multimedia rooms equipped with information technology appliances; digital learning resource production room (when necessary); appliances that support face to face learning; information technology appliances in support of management; online conference system; monitoring system; tools and solutions for high interaction between teachers and students in online learning.
As a result, education management in general and learning management in particular require efficient information technology platforms, LMS, LCMS, etc.

Series model

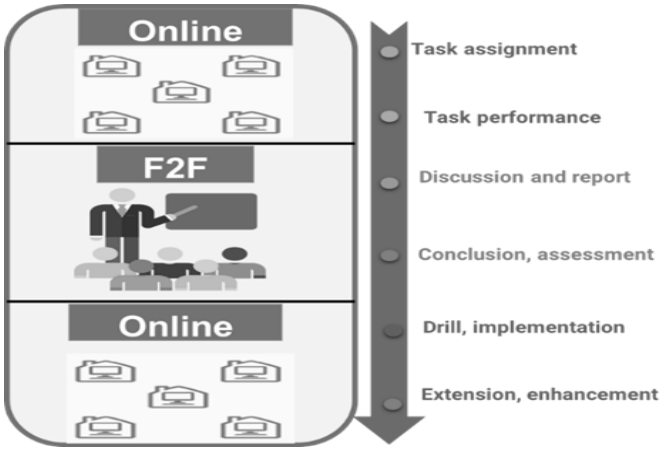

Figure 8. Series model

Characteristics of the model: online learning has a dominant role. All phases, from management to assessment, are systematically conducted in line with the outcome of the curriculum.
Learning content/topic is redesigned to suit online learning and define/select goals required to meet, inflexible combination with other learning methods such as project-based learning and flipped classroom. Usually practice, real-life experience, or learning orientation (giving guidance, report, or answers) are suitable for face-to-face learning. Meanwhile, learning information providing activities relevant to the structure or content of a session or test/assessment is suitable for online learning. Time allocation depends on regulations delivering the subject through face-to-face and online learning; tests and assessments are conducted through both face-to-face and online learning. Teachers are required to be capable of information technology skills and to have experience with online learning.
Preparation for infrastructure: Essential requirements include: Internet access; servers for storage and local network; Computer laboratory; Special learning rooms and multimedia rooms equipped with information technology appliances; digital learning resource production room (when necessary); appliances that support face to face learning; information technology appliances in support of management; online conference system; monitoring system; tools and solutions for high interaction between teachers and students in online learning.
As a result, education management in general and learning management in particular require efficient information technology platforms, LMS, LCMS, etc.

DISCUSSION

Based on definitions of blended learning, the authors have conducted surveys of blended learning in public high schools in Nam Dinh province and proposed blended learning models for public high schools to meet new requirements in line with the 2018 General educational Curriculum. Findings and discussions result from actual conditions, and proposals for models focus on the following aspects:
Blended learning, with various models, has been a subject for research and implementation in many countries and has helped to improve self-study, interaction, etc. This depicts the digital transformation in education. Most teachers in Viet Nam are unfamiliar with blended learning and its models. During the past two years, with the spread of the Covid-19 pandemic, the schools have adopted online and face-to-face learning, but this has been merely a response to the pandemic, lacking an effective combination of two learning methods to achieve

educational objectives. Consequently, blended learning has not been paid due attention or efficiently implemented. As a result, the application of blended learning in Viet Nam is a promising prospect that needs further research.
The models above can be applied to public schools in Viet Nam. Among those Parallel support, model 1 (face-to-face driver) is more suitable for conditions of most schools, for learning time and education management have not gone through a considerable transformation and online learning is considered parallel and supportive activity. Parallel support, model 1 (face-to-face driver) can serve as a transition to gradually introduce teachers and students to blended learning. The Series model is more suitable for schools that have an integrated system for learning, management, test, and assessment (LMS, LCMS, etc.) since it is necessary to maintain a harmonious combination of online and face to face learning in terms of goals, tests and assessment, and learning time. Similarly, Parallel support, model 2 (online driver), is only suitable for schools that have integrated LMS.
There is no one-size-fits-all model, and appropriate models vary by learning subject. That stems from the fact that schools differ in their teachers and students, their conditions, goals, and missions. As a result, the choice of models depends on schools' available resources on the condition that it creates the most effective learning conditions. One school can even choose all three models and adapt them to suit themselves. For instance, gifted schools can choose a series model for all subjects and learning activities and Parallel support, model 1, to deliver lessons for students taking part in special contests at the provincial or national level. Meanwhile, other general schools can apply for Parallel support, model 1 for most subjects and education activities, and series model for specific subjects/ education activities. Parallel support, model 2 (online driver), is suitable for most optional subjects in Vietnamese high schools.
In addition, most teachers and students have acquired specific online learning skills, and students have shown positive attitudes toward online and face-to-face learning. This is favorable for implementing blended learning. Implementing the Ministry of Education and Training's guidance for online learning and education in the light of the Covid-19 pandemic has sharpened information technology skills for various teachers. However, to meet requirements in the new period and effectively implement blended learning, they need to further those skills as well as methods used for blended learning, test, and assessment.
As Viet Nam has transitioned to a 'new normal' mode and students have come back to schools, public schools in Viet Nam can and need to enhance blended learning as it constitutes an effective method and a harmonious combination of online and traditional learning. It helps teachers and students take advantage of the flexibility and other advantages of online learning while retaining the interaction and social communication of face-to-face learning. With the 2018 General educational Curriculum implemented in public high schools, apart from 5 compulsory subjects, students can choose five optional ones. As their choices may significantly vary, schools may face difficulties in arranging teachers or preparing the infrastructure. Implementing proposed blended learning models may help to deal with these difficulties.
The following factors are necessary for the successful implementation of blended learning: financial plan for purchasing commercial or open-source software; diverse digital learning resources; models for education management, LMS, LCMS; reasonable time allocation for online and blended learning to utilize the advantages of each model.

CONCLUSION

Surveys of blended learning in Nam Dinh indicated that teachers and students in public high schools have had opportunities to experience and enjoy blended learning advantages. Nevertheless, they are faced with many obstacles: the absence of LMS, digital learning resources, and a unified model. Models proposed in this research can help deal with those obstacles and maximize advantages. Those models will be piloted in certain general high schools in Nam Dinh to measure feasibility and productivity and to define necessary adjustments to suit teachers and students' conditions, capability, and requirements. Parallel models and series models can offer teachers flexible choices for certain subjects, classes, or groups of students. For successful implementation, apart from piloting and completing models, it is necessary to have consensus and schools' efforts (including management officials, teachers, and students) and support and contribution from parents and guardians.

ACKNOWLEDGMENT

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