

12 Application of Blended Learning in Teaching and Learning at High Schools in Vietnam

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1 Introduction

Humanity has gone through three industrial revolutions and is entering the era of the Fourth Industrial Revolution (Industry 4.0). The Fourth Industrial Revolution is predicted to have great impact on all aspects and all areas of the society, in all countries, especially in developing countries (Lasi et al., 2014). For education, the Fourth Industrial Revolution marks the development of increasingly sophisticated educational technology. With the arrival of online learning, subjects no longer must be taught with simple lectures and printed materials, and teaching must not take place only in face-to-face context.

Instructional technologies developed for the Fourth Industrial Revolution have generated many flexible models for teachers and learners; Blended Learning (B-Learning), which is the focus of this chapter, can help educators overcome some of the limitations of both face-to-face and online learning (Erita et al., 2020). Education technology became critical during the coronavirus (COVID-19) pandemic of 2020–2021, which forced schools to move all of their teaching and learning online. It also has heralded a paradigm shift in the education system to create and enable technology-dependent learning environments that can be maintained in a post-pandemic world. This is critical not just for students but for teachers' professional growth (Sabowala & Manghirmalani, 2021).

B-Learning is still fairly new in Vietnam. It has been embraced by both Vietnamese education experts and learners familiar with the concept. The term B-Learning is increasingly being used in Vietnam to describe how electronic learning (E-learning) can be combined with traditional classroom methods. Initially, B-Learning was researched and implemented in Vietnam only in universities (Thao, 2003), but when the COVID-19 pandemic appeared in Vietnam, the B-Learning model became well known in high schools as well. This raised questions about how students with different learning habits, socioeconomic backgrounds, and career aspirations adapt to a new learning system (Trung et al., 2020). One consideration is how to create new sources of data and instill new learning habits in students in the context of the pandemic (Tran et al.,

2020). Whether learning in the form of face-to-face learning, online learning, or B-Learning, it is important to understand the feelings and motivation of students in the B-Learning process (Phan et al., 2020). In this chapter, the author discusses and analyzes various aspects related to the application of the B-Learning model in teaching and learning in high schools in Vietnam.

2 Overview of B-Learning

Online technology began to penetrate the classroom with the advent of the Internet and the World Wide Web in the 1990s. The term “Blended Learning (B-Learning),” first used by Friesen, refers to “almost any combination of technologies, pedagogies and even job tasks.” B-Learning is the whole or partial online learning of certain knowledge or traditional instructional methods for students to approach theories in the aforementioned methods (Graham et al., 2013). B-Learning is an effective combination of different modes of delivery, models of teaching, and styles of learning (Clayton & B, 2012). B-Learning involves the combination of two fields of concern: Education and educational technology (Wang et al., 2004).

In the early years of the 21st century, the term B-Learning appeared in scientific works and was applied in some universities in countries around the world. Learning activities according to the B-Learning model combine a wide variety of situations and techniques to enhance learning (Allan, 2018). Some studies found B-Learning to have the potential to increase learner engagement in the context of higher education innovation (Graham, 2018).

B-Learning is an instructional method that combines face-to-face classroom and online learning methods (Hoat, 2016). One advantage is that it provides quick and easy access, anywhere and anytime, to resources for anyone who has an Internet connection. Therefore, B-Learning offers a way for teachers and students to communicate that is independent of time and place. B-Learning improves students’ achievement, supports collaboration, enhances the ability to find learning materials, and develops study-related skills, among other advantages. Because learners are taught not only through conventional instructional methods in the classroom but also through self-study and interaction in the community, the B-Learning method offers a flexible option for teaching and learning in the context of the Fourth Industrial Revolution (Mustadi et al., 2021).

The B-Learning model generally refers to an instructional approach that combines direct and computer-mediated instruction delivery processes within a

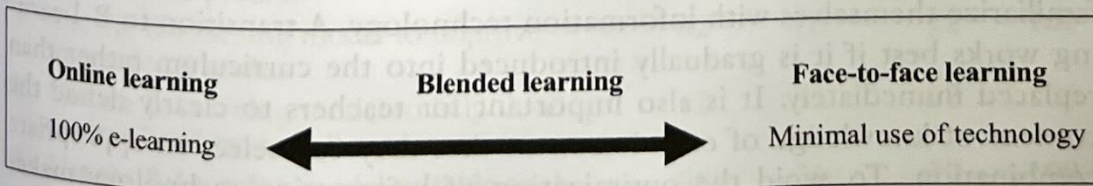


Figure 12.1 Overview of B-Learning and face-to-face learning (Allan, 2018)

formalized educational learning context. B-Learning integrates technology to allow learners “control over time, place, path and/or pace” of their learning to some extent. In addition, B-Learning approaches may vary depending on the content being taught, the specific needs of the learners, and the interests of the instructor (Yang et al., 2019). For B-Learning to be effective, teachers and learners must be prepared to use technology and must have an Internet connection. Teachers will be required to prepare lectures and adjust instructional methods to suit the B-Learning environment (Saboowala & Manghirmalani, 2021).

Like other methods of learning, B-Learning can lead to more effective learning. Lessons applied via B-Learning can enhance students’ competence, self-discipline and self-study, problem-solving skills, and creativity (Dao, 2020). Lessons applied via B-Learning also can stimulate students’ interest in learning and offers students more opportunities to study and exchange and discuss ideas with other students and teachers on their own (Huy & Trang, 2018). Students can develop self-study skills and improve their ability to search for learning materials and to spontaneously discover new knowledge, all of which can help them gain confidence (Dai et al., 2020). Well-designed lectures can make students more active in class and help them discover and acquire knowledge faster (Son, 2015). Students know how to apply knowledge taught faster because they study their previous lesson on their own and do homework before going to class (Huy & Trang, 2018). But if B-Learning is applied, students will self-study, self-search for learning materials, and then self-study at a higher level, thereby forming self-study, which is especially reflected in complete self-study as the highest B-Learning form (Loi, 2021).

B-Learning has some disadvantages and limitations, most of them having to do with practical matters. These include (a) the combination of face-to-face learning and online learning for students takes a lot of time, resulting in unsatisfactory time in each period; (b) teachers in high schools, especially the teachers with high seniority, are often hesitant to approach a new form of teaching; (c) modern facilities in high schools are still limited; (d) school hours in high schools are scheduled according to the timetable, while the curriculum is subject to program delivery, which leads to discontinuity in the instructional process, especially for the lessons with two consecutive periods; (d) the lesson plan design can create confusion for teachers and students in the early stages of implementation.

To achieve optimal effectiveness, it is useful for teachers and learners to familiarize themselves with information technology. A transition to B-Learning works best if it is gradually introduced into the curriculum rather than replaced immediately. It is also important for teachers to clearly define the content of knowledge of each lesson so that they can select an appropriate combination. To avoid the optimization of information technology makes students only learn and moves away from the practice of the subjects (Welker & Berardino, 2005).

3 Current Use of B-Learning in Some High Schools in Vietnam

In order to understand how B-Learning is being applied in Vietnam, the author conducted qualitative and quantitative research involving Thua Thien Hue province. The study included questionnaires for 100 teachers and interviews with 25 teachers in the province. The author focuses on a number of issues aimed at understanding common teaching methods in high schools, teachers' skills in using information technology, and teachers' perception of the need to apply B-Learning.

From the survey results of 50 high school teachers, the B-Learning model is being applied in high schools as follows:

Table 12.1 Survey results on the application of the Blended Learning model in high schools

No.	Content of survey	Number of participants who answered			Total
		Agree	Undecide	Disagree	
I	<i>Current common instructional methods in high schools</i>				
1.	Teach in class, assign homework through printed materials	46	42	12	100
2.	Teach in class combined with online learning	28	30	42	100
3.	Teach completely online	0	22	78	100
4.	Teach in class, assign exercises online combined with printed materials	68	24	8	100
II	<i>Teachers' skills in using information technology</i>				
5.	Make good use of basic information technology in teaching	52	44	4	100
6.	Proficient in use of educational software and websites	12	24	64	100
7.	Self-develop the E-learning system into teaching	12	24	64	100
8.	Self-develop the system of lectures, tests and content on the E-learning system during the instructional process	24	8	68	100
III	<i>Teachers' perception of the role of B-Learning in teaching</i>				
9.	Use the B-Learning model to help teachers and students be more active in the instructional process	66	24	10	100
10.	Use the B-Learning model to improve instructional quality	62	16	22	100
11.	Use the B-Learning model to help develop students' self-study skills	42	30	28	100
12.	Use the B-Learning model suitable to the current instructional conditions in high schools	66	24	10	100

Current Common Instructional Methods in High Schools

In analysis of Table 12.1 from questions 1 to 4, we get the results of the teachers' current instructional method shown in Figure 12.2.

According to Figure 12.2, face-to-face learning is still the main teaching method in high schools in Vietnam, while online learning only accounts completely for a modest proportion. However, observing the middle column of the chart, the B-Learning method has been used by some teachers, but the number of teachers using it is not much. The majority of teachers agree they teach in class and assign lessons in the traditional method (through printed materials, textbooks, workbooks, etc.). There is a percentage of teachers who have combined in-class teaching with an online homework assignment. However, the application of the B-Learning model in the instructional process is still limited.

Skills of Using Information Technology of High School Teachers Today

Analysis of Table 12.1 from questions 5 to 8 shows results of the teachers' current instructional process shown in Figure 12.3.

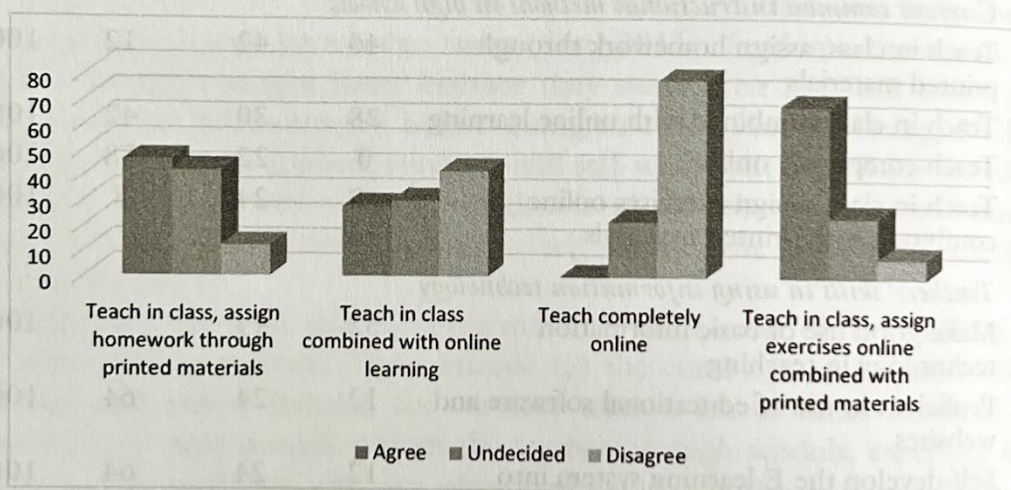


Figure 12.2 Current instructional methods in high schools

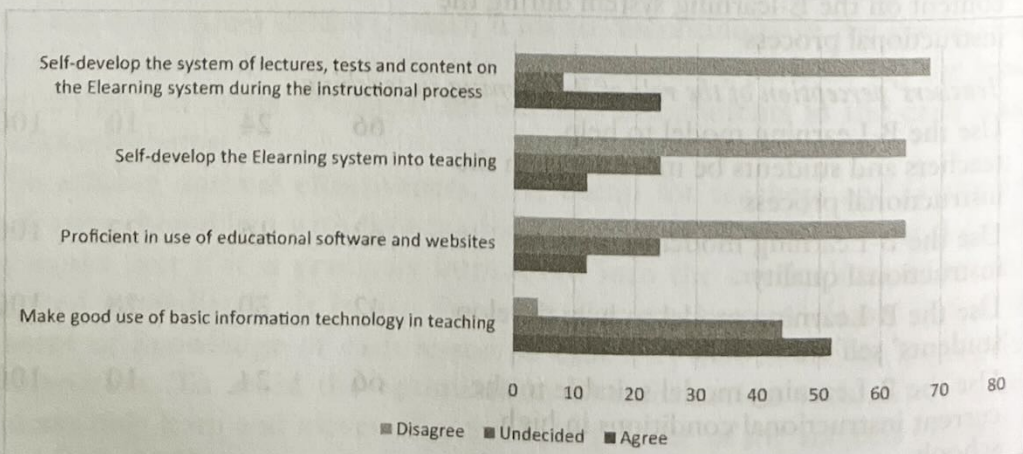


Figure 12.3 Information technology skills of high school teachers in Vietnam

Teachers' skills in using information technology in high schools in Vietnam are at a basic level using simple educational software; only using some available educational websites; and e-lectures that can be built. However, only 6 out of 50 teachers (accounting for 12%) are able to build an E-learning system by themselves and build the program content on the E-learning system.

Teachers' Perception of the Role of the B-Learning Model in Teaching and Learning

Analysis of Table 12.1 from questions 9 to 12 shows results of the teachers' current instructional process shown in Figure 12.4.

Figure 12.4 shows the number of teachers who agree that the B-Learning model in teaching and learning in high schools is very necessary to help bring about more efficient teaching and learning. Of 100 teachers surveyed, 66 (or 66%) say the Blending Learning model helps teachers and students to be more active in the instructional process; 62% say the B-Learning model in high schools is highly efficient in teaching and learning; and 66% agree with the idea of using the B-Learning model in accordance with the current instructional conditions in high schools. These findings suggest that it is possible to implement B-Learning in high schools in Vietnam.

Survey results also show that, while the teachers are aware that the B-Learning model will help improve instructional efficiency, the application of B-Learning in teaching and learning has not been of interest to them, and their information technology skills are poor. To better understand this result, 25 interviewed teachers were asked: "Has your school applied Blended Learning in teaching? What are the difficulties encountered when applying it?" The following are responses from three typical teacher responses in various contexts (urban, rural, remote area):

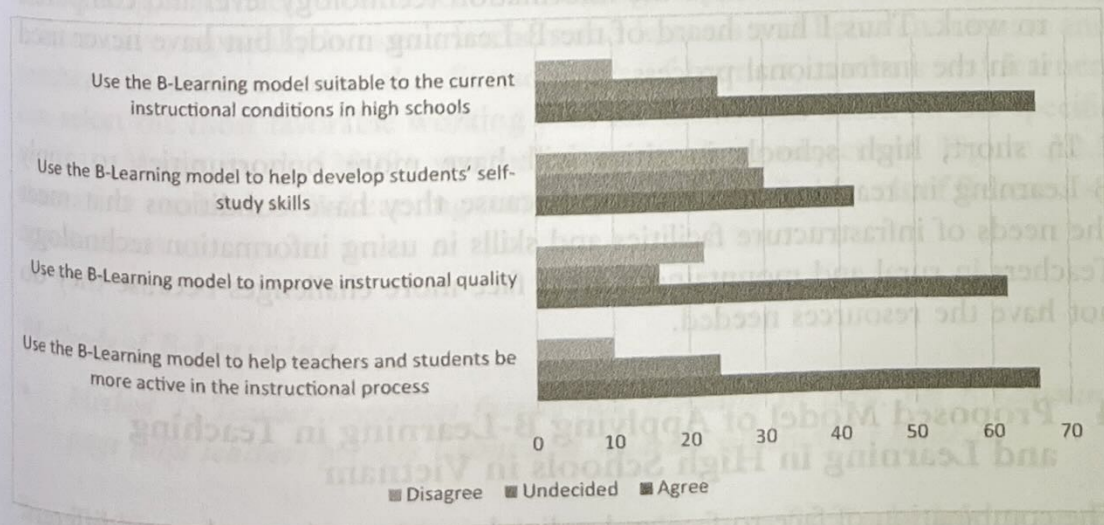


Figure 12.4 Teachers' perception of the role of the B-Learning model in teaching and learning

A teacher with a master's degree in chemistry, with 28 years of seniority teaching at a high school in Hue city, Thua Thien Hue province, says

Before 2019, only a few teachers attending the initiative of experience thought of designing an E-learning system to support teaching and learning, but such system was not professional, thus they did not put it into the B-Learning process. From 2019 onwards, when the Covid-19 pandemic takes place, the school encourages the use of B-Learning model based on the pandemic developments. I don't have any difficulty with the B-Learning process because the facilities of teachers, schools, and students all meet the basic requirements.

A teacher who has a bachelor's degree in biology, with 11 years of teaching experience at a high school in Phong Dien district, a district in Thua Thien Hue province, says:

I have also tried to design E-learning to support teaching and learning, but have not been successful. In school, some teachers do not have good information technology skills. The school has 20 computers; Students also do not have computers, some students have phones but cannot connect to the Internet, thus teaching according to B-Learning at my school has been implemented but not implemented.

A teacher who has a bachelor's degree in mathematics, with 23 years of teaching experience at a high school in A Luoi district, Thua Thien Hue province, says:

I live in a mountainous district, with the quite difficult economic conditions. Thus advocating for students to attend school is difficult, most of the students are from ethnic minorities, and their dropping out is frequent. Teachers also do not have the information technology level and computers to work. Thus I have heard of the B-Learning model but have never used it in the instructional process.

In short, high schools in cities will have more opportunities to apply B-Learning in teaching and learning because they have conditions that meet the needs of infrastructure facilities and skills in using information technology. Teachers in rural and mountainous areas face more challenges because they do not have the resources needed.

4 Proposed Model of Applying B-Learning in Teaching and Learning in High Schools in Vietnam

The combination of face-to-face and online learning can be used many different ways. Charles R. Graham's 3 most common types of B-Learning combinations

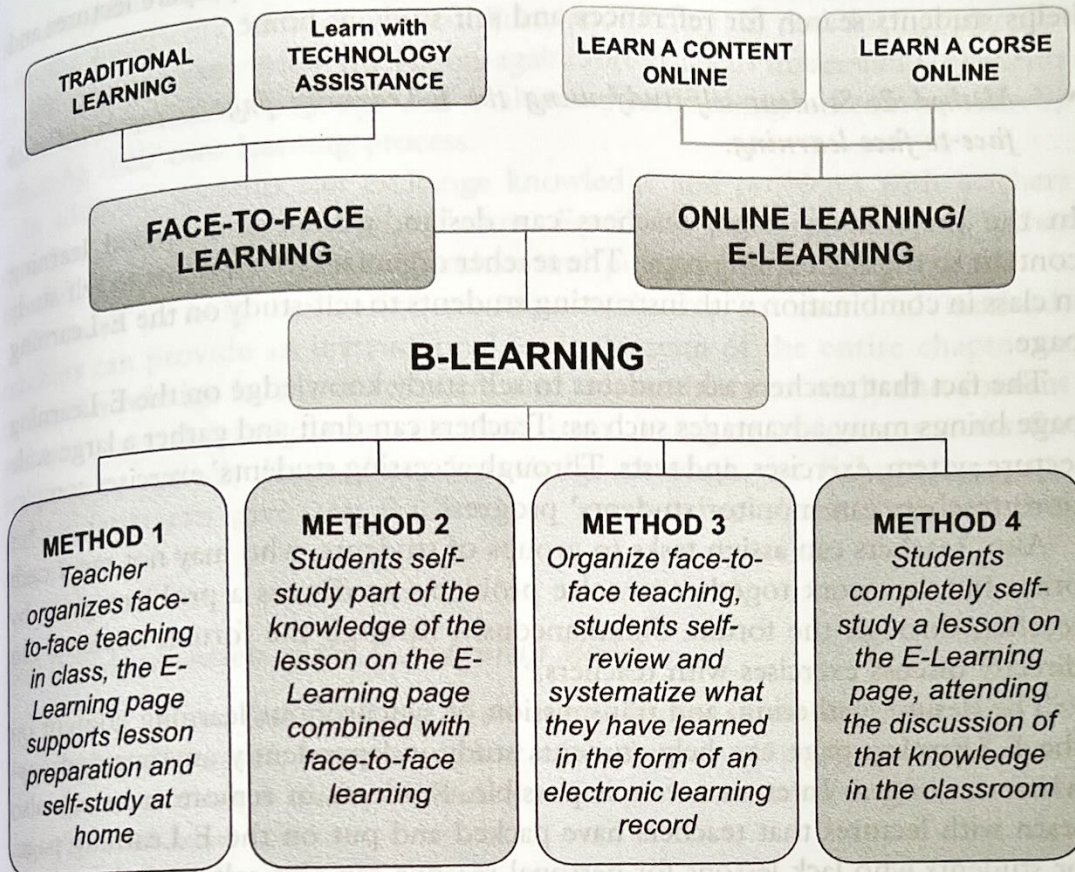


Figure 12.5 Proposed B-Learning instruction methods in Vietnam

are: (a) Combining instructional modalities (or delivery media); (b) combining instructional methods; (c) combining online and face-to-face instruction. These combinations can be applied at various stages of the teaching process depending on teaching objectives or the level of technology support. At its best, B-Learning is interactive, especially between learners and learners and between learners and teachers. In order to meet the diverse needs of learners, teachers and learners can select the most favorable working plan for themselves based on the specific context. Means et al. (2009) was based on teaching objectives. Figure 12.5 shows four methods of B-Learning corresponding to the four levels of B-Learning combination.

Methods of B-Learning

- *Method 1: Teacher organizes face-to-face learning in class, the E-Learning page helps teachers prepare lessons and students self-study at home.*

The teaching process takes place in class according to a fixed schedule or under the instruction of teacher. The main reference materials are textbooks,

workbooks, reference books, etc. E-Learning helps teachers prepare lectures and helps students search for references and self-study at home.

- *Method 2: Student self-study using the E-Learning page is combined with face-to-face learning.*

In the preparation stage, teachers can design, gather, and upload learning content to the E-Learning page. The teacher organizes for students to self-study in class in combination with instructing students to self-study on the E-Learning page.

The fact that teachers ask students to self-study knowledge on the E-Learning page brings many advantages such as: Teachers can draft and gather a large-scale lecture system, exercises, and tests. Through accessing students' exercises completion, teachers can monitor students' progress.

Also, teachers can assign tasks to groups of students, who may not meet each other but can work together to solve problems or discuss a problem given by teacher, through the forum. Simultaneously, through the forum, students can directly discuss exercises with teachers.

The design, gathering, and transmission of synchronous learning content on the E-Learning page can help students study independently anytime and anywhere as long as Internet access is possible. Students in remote areas can also learn with lectures that teachers have packed and put on the E-Learning page, or students who lack lessons for personal reasons can also self-study lectures to acquire new knowledge.

- *Method 3: Organize face-to-face learning, students self-review and systematize what they have learned in the form of an electronic learning record.*

Using this instructional method, teachers introduce new knowledge content in a face-to-face setting, then ask students to review on their own what they have learned; systematize such knowledge in the form of mind maps, formulas, etc.; and save them as electronic learning records through the E-Learning page. For students to be able to do this effectively, teachers need to instruct students on how to "save" knowledge in the form of electronic learning records through face-to-face lessons or through an exchange forum on the E-learning page. This activity helps students to more deeply comprehend the knowledge they have learned and, simultaneously, improve the level of information technology for students.

- *Method 4: Students self-study a lesson completely on the E-Learning page.*

This is the highest form of self-study of students in B-Learning, in which students self-study to find materials and self-study new knowledge with synchronized

lectures. After that, students can do the exercises online, compare their results with the homework instructions to adjust, and if they do not do the exercises as desired, they can review the lesson again and again to understand. Students can then test their knowledge and evaluate their learning outcomes, thereby adjusting their own learning process.

In addition, students can exchange knowledge and problems with teachers or other members through the forum. Feedback from teachers and other members helps students solve difficulties and problems in learning.

In order to help familiarize students with this instructional method, teachers can provide an instructional logic diagram of the entire chapter or certain knowledge in the curriculum and ask students to study the content and complete the assignment on their own. Teachers assign any tasks for students to actively learn those knowledge through the E-Learning page and students can give any feedback to the teacher about their learning outcomes.

Levels of Application of the B-Learning Model

- *Level 1: face-to-face learning of the entire lecture in the classroom with the support of electronic lectures, teachers ask students to self-study on the E-Learning system through multiple-choice exercises and constructed-response exercises after each lesson.*

At this level, face-to-face learning is key. The instructional process takes place entirely in the classroom according to the schedule or under the instructions of teacher with the support of electronic lectures, educational software, etc. Teachers assign tasks to each individual student to complete on the system through online exercises. In addition to reinforcing the knowledge they have learned in the classroom through exercises and tests, this format enables students to also compare and evaluate their own learning outcomes. In addition, if students have questions or do not understand, they can self-study by logging in and reviewing synchronized lectures addressing what they have learned in class.

- *Level 2: Organize face-to-face learning, the E-Learning page consolidates knowledge, evaluates the results of self-study on E-Learning through traditional classroom lessons.*

Students engage in self-study on the E-Learning page of content that is not taught in a traditional classroom. Face-to-face learning is carried out at the stage of application, examination, and evaluation of learning outcomes. Teachers reinforce students' knowledge and evaluate students' self-study results.

At this level, students study on their own but still work under the guidance of teachers. Students are assigned tasks and asked to research problems on their own, discuss with their friends, and directly interact with their teachers to develop new knowledge. This approach can help students learn more efficiently and promotes positivity and self-reliance in learning.

- *Level 3: Students self-study some of the knowledge content related to the new lesson through the E-Learning page, teacher organizes face-to-face learning with the remaining content of the lesson.*

At the preparation stage of this level, teachers design, gather, and transmit learning content, create forums, and give instructions for students to self-study online. In the instructional stage, teachers directly answer students' questions and problems during the process of online learning in traditional classrooms. This form of self-study promotes the advantages of both face-to-face learning and online learning. Students are encouraged to work independently, develop self-discipline, and actively explore research in the process of acquiring knowledge.

- *Level 4: Completely online learning, face-to-face learning to support and answer questions for students.*

At this level, all content and curricula are uploaded to the E-Learning system, and students study, on their own, a certain unit of knowledge related to the overall lessons. This approach helps reduce the load of knowledge-acquisition in class. Students attend the course by registering online and the self-study process takes place entirely online.

This is a high level of self-study of B-Learning learners, in which teachers are not expected to deliver knowledge modules directly in class. The teacher must prepare a lesson plan and then discuss it with students in advance (for example, at the end of the previous lesson). Similarly, at the end of this lesson, the teacher must assign students the task of self-studying some of the content for the following lesson; for example, students may need to read and research textbooks and reference materials and/or log into the E-Learning page to watch a lecture. Teachers will test this knowledge when preparing new lessons and answer students' questions during the self-study process. At a higher level, students discuss material with each other and draw conclusions by themselves (while under the teacher's direction). However, teachers also need to help solve problems for students through traditional lessons in the classroom.

With this combination of instructional methods and levels, student online self-study gradually increases. Students become more active in mastering knowledge but have not eliminated the role of teachers. Students and teachers still communicate face-to-face through traditional face-to-face lessons.

5 Example of Applying B-Learning in Teaching Physics in High Schools

This section shows how Moodle software is used to build a “Vatly-blearning Geometrical Optics” webpage with the interface as shown in Figure 12.6: Participating groups for the system include:

- System administrator is responsible for the entire operations, including user authorization and interface changes.
- Teacher is someone assigned to be in charge of a certain class. Teacher is entitled to manage the students’ information in that class. In addition, teacher answers any questions and concerns of students.
- Students are those who have registered for a class and are accepted by the system administrator to attend that class. Students are entitled to take lessons compiled by their teachers, ask and answer questions, and take exams organized by system administrators and teachers.
- Figure 12.7 highlights the online course materials and self-study activities available to students who register on the Vatly-blearning Geometrical Optics webpage:

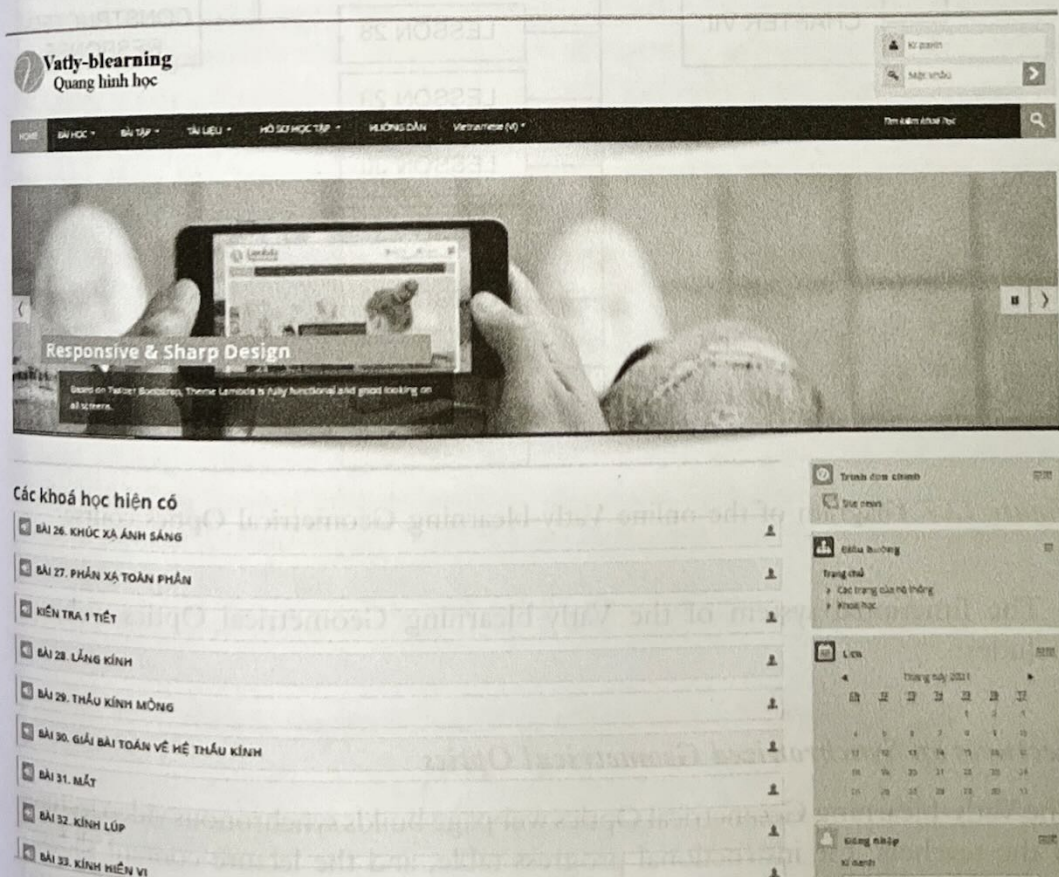


Figure 12.6 Vatly-blearning Geometrical Optics webpage interface

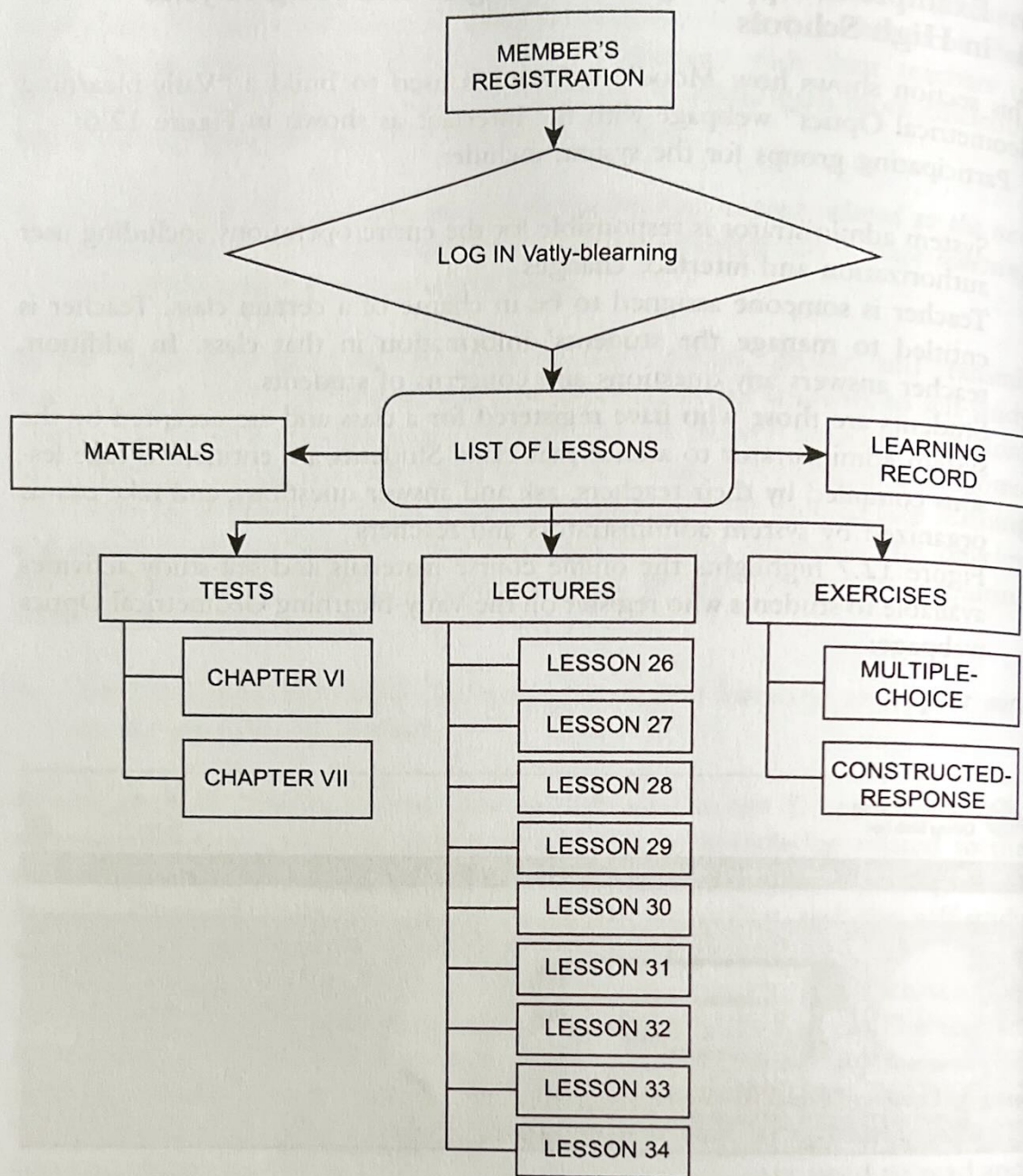


Figure 12.7 Diagram of the online Vatly-blearning Geometrical Optics course

The functional system of the Vatly-blearning Geometrical Optics webpage includes:

Lectures on Synchronized Geometrical Optics

The Vatly-blearning Geometrical Optics webpage builds synchronous video lectures of the teachers, the instructional progress table, and the lecture content slides.

Synchronized lectures have information-rich content, including video and audio. Using the table of contents, students can select the item they are interested

in. On the video, students see their teachers giving the lectures while any related information is displayed on the PowerPoint screen. Students can adjust the controls to quickly play, replay, slowly play, pause, or go straight to a topic of concern.

Online Geometrical Optics Exercises

The purpose of this online exercise is to help students reinforce learning by solving the exercises at the end of each lesson. Through the exercises, students can review the knowledge they have just learned and simultaneously practice with a self-test and evaluate their progress online. These online exercises come with solutions and instructions, enabling students to complete the exercises themselves. Furthermore, after each exercise, students receive instructions, assessments, and comments such as evidence of errors or gaps in knowledge and knowledge content that can help them review and correct themselves. For example, the Vatly-blearning Geometrical Optics webpage includes 134 multiple-choice questions in the section of Physics 11 to help students review and consolidate their knowledge.

Online Assessment of Geometrical Optics

The tests bank has a very flexible designed database that questions with levels of difficulty, questions that are evaluated differently, and sub-questions. When building a test, teachers choose the test sections and time. For each section, they have the number of questions for each and the score for each. These options allow teachers to design a test that helps fully assess a student's ability. The tests bank of the Vatly-blearning webpage includes 88 objective multiple-choice questions for the Geometrical Optics section. The system will randomly generate test questions based on the information that the user has entered: Test sections, number of questions in each section, score for each section. The system will get information about the questions in the question bank already in the database to give suitable tests at the time students start taking the exam. With a large enough question bank, it is guaranteed that no duplicate test questions exists, ensuring fairness and accuracy in the exam. The generation of test questions is done after thoroughly studying mathematical theory, dynamic planning, and optimization. From there, teachers continue developing procedures to generate test questions and ensure the accuracy of such procedures.

Online Materials to Support Teaching Geometrical Optics

The Vatly-blearning Geometrical Optics webpage contains electronic lesson plans and documents for reference, study, and research of teachers and students. It allows for the exchange of information between participants. The documentation of the Vatly-blearning Geometrical Optics webpage includes geometrical optics image files; materials for teachers' instruction and students' self-study such as

video documents; simulation experiments; virtual physics experiments; physicists; practical questions; etc. that support the instructional process of physics in general and geometrical optics in particular.

Students' Electronic Learning Records

Physical copies of student records such as documents, formulas, exercises, books, notebooks, paper boxes, file clips, etc.) can be digitized and stored, making it easier to look up, reread, use, correct, and update material. These documents are supported and illustrated by multimedia tools such as video, audio, image, etc. This can help students stay organized and inspire them to study independently. It also gives students the opportunity to improve their computer skills. An electronic database also is useful for teachers as they evaluate student work or offer students feedback.

6 Conclusion

The Fourth Industrial Revolution both challenges and enables Vietnam to strengthen B-Learning opportunities for teachers and students. The combination of face-to-face learning and online learning needs to be done carefully to avoid overdependence on information technology. Moreover, the application of B-Learning depends on the conditions of each high school. B-Learning is a student-centered method that transforms the way knowledge is conveyed and acquired. Students actively learn knowledge before going to class so that in the classroom knowledge is deepened through interaction with teachers and classmates. This approach also provides more options for summarizing and evaluating student learning outcomes.

B-Learning is an integrated learning method. In particular, learning is supplemented with online activities that enable students to study at least partially in a remote supervised learning environment. B-Learning can benefit learners by personalizing the learning program, giving students more autonomy, more opportunities for feedback from teachers, and increased interaction between teachers and students.

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