

Designing and using interactive e-books in Vietnam

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Abstract. E-books are now our imperative need. Because of their strong points, e-books help the process of learning a lot. E-books allow us to teach an infinite number of students without depending on location and studying time. In addition, E-books improve independent thoughts, creative thoughts and informatics thoughts for students.

Keywords: e-books, e-learning, technology.

1. Introduction

In recent years, the research, design, and produce tendencies of ebooks have been developing a lot. An e-book called Class-book produced by Vietnamese Education Publishing House has justified the above thing. Students learning with the e-book can avoid carrying books cumbersome. If students buy this e-book, they can use it in all 12 years of learning. Because e-books can interact in two dimensions with customization ability, multimedia content, they help students learn enthusiastically. In addition, e-books have other functions that ordinary books do not have, such as feedback, relating documents, adapting to the fast changing world, etc. Therefore, e-books were and will be the first selection in innovating methods, equipment and learning contents.

Although e-books are important, being researched and developed strongly, some of us still do not know what e-books are, how many kinds of e-books there are, what characteristics e-books have, what the differences between the learning with e-books and the learning with e-learning are. Thus, we will refer to these things in the article. Moreover, we have also built an interactive geometry e-book, which has many strong points of technology, and is better than current e-books. We have also designed tools that allow us to divide learners, e-communication, etc. in order to help the process of learning better.

2. Research content

2.1. The conception on e-books

According to Wikipedia, an electronic book (digital book, e-edition) is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices. Although sometimes defined as “an electronic version of a printed book”, many e-books exist without any printed

equivalent. Commercially produced and sold e-books are usually intended to be read on dedicated e-book readers, however, almost any sophisticated electronic device that features a controllable viewing screen, including computers, tablet computers, and smartphones can also be used to read e-books. (Wikipedia)

The electronic counterpart of a printed book, which can be viewed on a desktop computer, laptop, smartphone or e-book reader. When traveling, a large number of e-books can be stored in portable units, dramatically eliminating weight and volume compared to paper. Electronic bookmarks make referring easier, and e-book readers may allow the user to annotate pages. (Encyclopedia)

An e-book is the presentation of electronic files on a digital screen. Although the term e-book has implied its information expressed in a book form, it also shows that the book content is expressed on some device. These are two basic characteristics to recognize the difference between an e-book and a traditional book. Static writing and static image are typical of a book in general, including traditional books and e-books. However, an e-book also shows animated images and sound that a traditional book does not have. The files of an e-book can be provided as sound recorded units (disc), or can be downloaded from an information store by e-readers (including websites of the Internet). (Vst.vista.gov.vn)

In our opinion, an e-book is a book software product having an interface and functions that act on the Internet or without the Internet. An e-book can be viewed on personal computers, e-readers, tablet computers, or smart-phones. An e-book can integrate many kinds of advanced and modern technology of informatics and media in order to serve information transmitting, learning, and studying best.

2.2. The characteristics of e-books

According to us, there are four characteristics of e-books now, as follows:

First, e-books are book software products, so they have mechanical structures as normal books. They have e-book pages. We can access their pages randomly as normal book pages.

Second, e-books are book software products acting on the Internet or without the Internet. That is, e-books act on both on-line and off-line well (acting on off-line will restrict some functions of e-books). Indeed, when we refer to this thing, we want to refer two ideas. The first is that e-books act on the Internet. From this, we can design e-books having outstanding functions due to the Internet. That is, e-books can educate an infinite number of students, and educate without depending on location and learning time. Students can learn with many teachers at the same time and at various locations. All students who are not of the same skin color, country, nation, etc. can still learn. E-books are equipped artificially intelligent which can give predictions and feedback of tests, self-study exercises,

etc. immediately. E-books allow us to insert animated images, videos, etc. in order to make lessons deep and understandable. In addition, e-books allow us to organize learning acts that improve the activeness of students by using interactive tools and functions of e-books. The second is that e-books act on the Internet. From this, we can design e-books as normal packaged software. If we design like this, there are not the typical functions acting on the Internet such as the tele-learning function, the function of live images and sound transmitting, etc. This idea is the basic characteristic when we distinguish learning with the help of e-learning from learning with the help of e-book. E-learning without the Internet does not act but e-books without the Internet still act normally.

Third, e-books always accompany with e-readers. Thus, besides transmittable content, e-books must focus on e-reader devices. These two factors are two close faces of e-books. The e-reader devices are diversified. E-books can be viewed on personal computers (PCs, laptops), e-readers (Kindle, Nook, Sony, Reader, etc.), tablet computers (Multiform: iPad, Android Tablets (Galaxy Tab, Kindle Fire, etc.), Surface; Specialized: Kno, Class-book) or smart-phones. Some learning forms (ex. e-learning) do not care about information transmittable devices. The devices of e-learning are often personal computers.

Fourth, e-books have the abilities to integrate the forms of advanced and modern technologies and the media in order to serve the best information transmitting. When we refer to this thing, we focus on the continuous development of e-books. If the technologies of e-books are advanced, so are e-books. Some technologies of e-books now are forums, e-dictionaries, text editing, hyperlink, and hypertext functions, etc. E-books have e-draft notebooks to help us draw figures, find out the solution to problems, verify, prove, express the visualization, etc. move and act on animated figures. E-books allow us to mark tests automatically and objectively, allow learners to do exams in a limited time, and decentralize marking exams to teacher. E-books give specific self-learning tasks to each student and allow us to divide students with an infinite number. After students do divided problems, e-books will give the results, a tree chart as well as a table of students' answers intermediately with just one click. E-books allow us to e-meet, e-teach, e-exchange, to share texts, sound, images, videos, PowerPoint, MP3, and MP4 files. E-books can also save the activities of users in e-documents. E-books allow users to improve the best activeness of learning and studying to develop independent thoughts and motivate users to learn knowledge for themselves. They also give users an impulse to inner motivation and creative desires. Some technologies which now we do not have yet and researchers are studying are artificial technologies. We need to equip e-books with an intelligent brain to allow them to self-learn, self-develop, and from that, they can solve problems given by other people or by themselves and solve new ones. In addition, e-books do not yet have remote technologies such as voice

technology, sound technology, etc. In the future, if these technologies are performed, e-books will develop greatly.

2.3. The classification of e-books

According to us, there are four kinds of e-books now, as follows:

Static e-books are digital text files as *PDF* files. *PDF* files are e-books with simple formats allowing readers to have access easily. The weak point of this kind is that it has no sound and graphics, and its structures are simple. It does not have many informatics functions except an only informatics transmitting function. Its strong point is that it has small capacity, so we can email it easily.

Dynamic e-books without changing content are softwares that are the same as other learning software using programming language, such as Flash programming language. This kind is only good for the English subject and multiple choice software of other subjects because their interfaces are nice and their interactions are high. However, their weak points are that they do not allow users to change the contents and the contents given are only the contents in a particular area. These e-books require users to have high programming levels and nice and varied graphic design abilities.

Dynamic e-books changing content are the same as e-books that are designed with PowerPoint software. E-books of this kind can integrate sound, videos and images and their strongest point is that they allow users to add, correct, change the contents of e-books as well as allow users to copy data. The weak point is that their images and interface are not as nice as *dynamic e-books without changing content*.

Interactive e-books are book software acting on the Internet or without the Internet that integrate many kinds of advanced and modern technology of informatics and media. The e-books are designed in order to serve information transmitting, learning and studying well as well as remedy the weak points of traditional information transmitting, learning and studying. The e-books show all the strong points of the above e-books such as nice and eye-catching interfaces and e-information sending with real time. In addition, they have other strong points that the above e-books do not have. They have two structures which are the full structure and the empty structure. The full structure allows teachers to provide information for students with a pedagogic intension. The empty structure allows users to build materials. Students can access the content and the process of learning. Interactive e-books have clear strong points as mentioned above. As a result, this kind of e-books improves the best activeness of users. The weak point is that it has high designed cost.

Of all the above e-books, *interactive e-books* now have the best ability to support learning in general and learning mathematics in particular at secondary schools according to the orientation of innovating learning methods.

2.4. The comparison between e-books and traditional books

According to us, the difference between e-books and traditional books is as follow:

Table 1. The comparison between e-books and traditional books

| <i>Traditional books</i> | <i>E-books</i> |
|--|--|
| <p><u>Strong points</u></p> <ul style="list-style-type: none"> - They are ready to use. - They do not need sub-equipment. - Their cost is rather cheap. <p><u>Weak points</u></p> <ul style="list-style-type: none"> - They are cumbersome and heavy when we carry a lot of books. - The contents are easily outdated in the context of a fast changing world, especially in science and technology areas. - The contents are restricted due to the fees of their print. - The contents are not easy to reuse among related books. - They do not contain multi-media functions (video, sound, or interaction.) - Each document is single and does not | <p><u>Strong points</u></p> <ul style="list-style-type: none"> - They are small and light according to the exploitable equipment, without depending on the quantity of e-books. - They can adapt to a fast changing world. - The new contents can be updated easily and timely. - The contents are multi-media. - They connect related documents: text books, reference books, dictionary books, and notebooks. - They interact with two dimensions with customization ability for students. - They allow users to feedback. - They allow users to approach other documents intermediately. <p><u>Weak points</u></p> <ul style="list-style-type: none"> - The cost is expensive (due to the need |

| | |
|---|---|
| <p>have a connection.</p> <ul style="list-style-type: none"> - It's difficult to read related documents. | <p>of sub-equipment.)</p> <ul style="list-style-type: none"> - They need to use electricity. - The longevity depends on the durability of user's equipment. |
|---|---|

2.5. The comparison between e-learning and e-book

According to us, the difference between e-learning and e-book is as follow:

Table 2. The comparison between e-learning and e-book

| <i>Factors</i> | <i>e-learning</i> | <i>e-book</i> |
|--|---|---|
| <i>Resources and learning location</i> | <ul style="list-style-type: none"> - The materials mainly depend on documents and graphic techniques. - The contents can change according to the decentralization of the administrator. - It happens in an imaginary class or an imaginary laboratory. | <ul style="list-style-type: none"> - The materials mainly depend on documents and graphic techniques. - The contents can change or are packaged without changing. - It happens in an imaginary class or happens every time and everywhere. |
| <i>Showed interface</i> | <ul style="list-style-type: none"> - It happens on the Internet. | <ul style="list-style-type: none"> - It happens on the Internet or without the Internet. |
| <i>Showed equipment</i> | <ul style="list-style-type: none"> - It does not focus on showed equipment. Showed equipment of e-learning usually is personal computers. | <ul style="list-style-type: none"> - It focuses on showed equipment. Showed equipment of e-books is personal computers, tablets, e-readers or smart-phones. |
| <i>The interaction between</i> | <ul style="list-style-type: none"> - It is via e-mail, chat, e- | <ul style="list-style-type: none"> - It is via e-mail, chat, e- |

| | | |
|--|---|---|
| <i>teacher and students</i> | forum, or e-class. - The information is communicated passively, and sometimes not globally | forum, or e-class. - The information is communicated intermediately and globally according to the equipment. |
| <i>The interaction between students – students</i> | - Students interact directly via e-mail, chat, or e-forum. - Space and time are limited. - The interaction depends on the consciousness of each member of the group. | - Students interact directly via e-mail, chat, or e-forum. - Space and time are not limited. - The interaction is 1-1. The effectiveness depends on each attended member. |
| <i>To assign a task and a check</i> | - In the classroom - The time is predetermined and limited. - The check depends on criteria. - The tests have a fixed number of questions. - It is based mostly on text. - We can just assign our tasks if we have the Internet. | - Everywhere - At every time and the time is not limited. - The check depends on each individual test. - The tests have a limited number of questions, depending on the competence of students - It is based on audio and animation. - We can still assign our tasks without connecting to the Internet. |
| <i>To set an exam and to assess students</i> | - Setting an exam is based on theory and | - Setting an exam is based on the reality and |

| | | |
|------------------------------------|---|---|
| | <p>practical problems</p> <ul style="list-style-type: none"> - Giving marks is according to teacher's marking scheme. - Tests are based on printed documents. - We can just set an exam and assess students if we have access to the Internet. | <p>situated problems.</p> <ul style="list-style-type: none"> - Giving marks is based on the competence of each student. - Tests are not on printed documents, so not costly. - We can still set an exam and assess students without having access to the Internet. |
| <p><i>Feedback information</i></p> | <ul style="list-style-type: none"> - It is almost not synchronous. The feedback happens after some time. - The feedback happens mostly according to group. | <ul style="list-style-type: none"> - They are both synchronous and not synchronous. The feedback is immediate and better. - The feedback happens according to individual, group, or divided learners. |

2.6. Building the interactive e-book at the address: <http://e-eduvietnam.edu.vn>

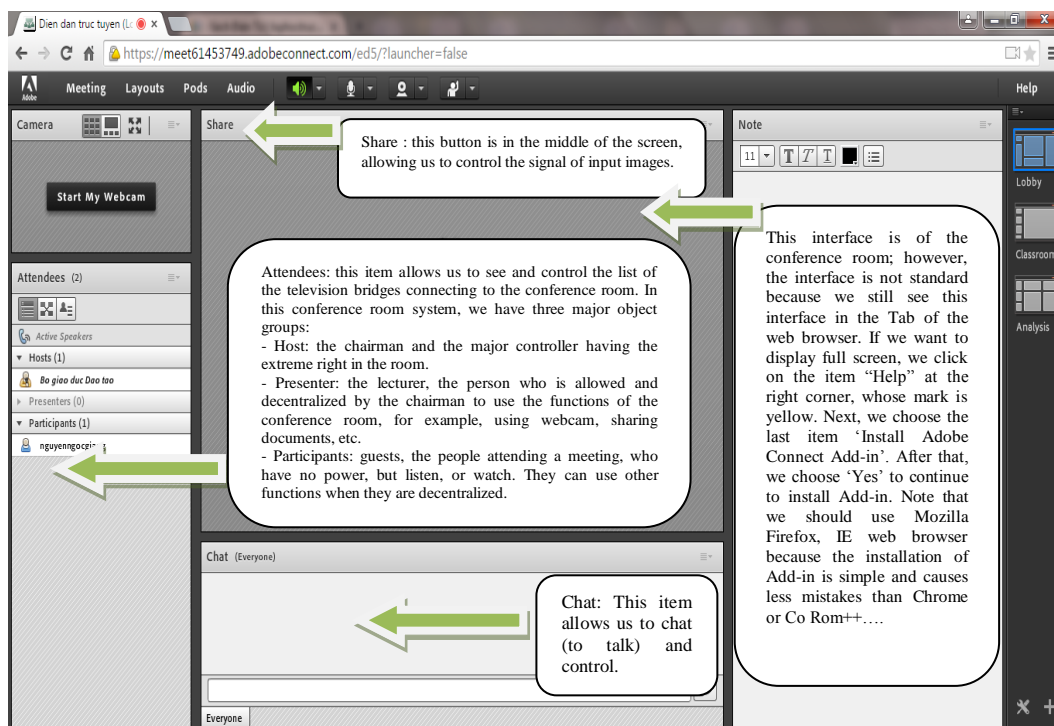
The structure of the e-book includes the following parts:

1. *E-book title*: The e-book title is *The interactive geometry e-book*.

The bar menu includes following items:

2. *E-forum*: E-forum is the Adobe Connect Enterprise software embedded in the e-book. E-forum allows us to organize conferences or e-conferences with a small or large size or we can apply E-forum to e-teach, etc.

After clicking the E-forum button, the interface of the e-forum is as follows:



Now, let's study the most basic parts and functions of the e-forum:

a. Images: this item allows us to **Switch on** or **Switch off** and control the signals of Webcam or Camera.

In order to switch on the images we click on the black square **Start My Webcam** in the middle of the screen, in the frame **Video**. After clicking on this square, the screen displays the announcement: **Camera and Microphone Access**. We click on the item **Allow** and the screen displays the window **Preview** with camera images or **Webcam**. In order to switch on the image signals, we click the button **Start Sharing**. After clicking on this button, we will see the image signals. This time, the official signals of images will be transmitted to all of the television places.

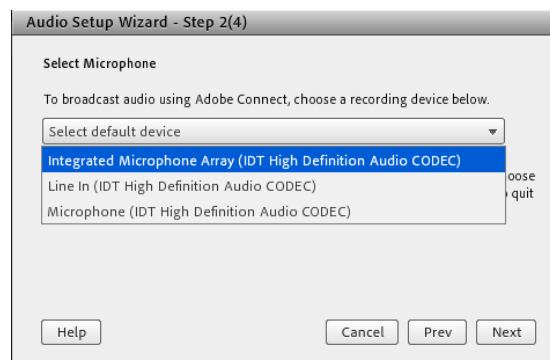
In order to switch off the image signals or to pause the images, we click on the **Stop My Webcam** button at the top right corner of the image frame.


b. Sound: This item allows us to switch on or switch off the microphone or adjust the sensitiveness of the microphone.


We choose **Microphone** and **Test loudspeaker**: this step is forced when we log in the conference room. This step is performed only one time and we do not need to do it again. This step allows us to choose the input signal of the microphone (if we have many input signals) and to test the loudspeaker as well as the sensitiveness of the microphone. In order to do this, we click on **Meeting/Audio Setup Wizard** on the menu bar. After that, we click on **Next** to continue the progress of installation.

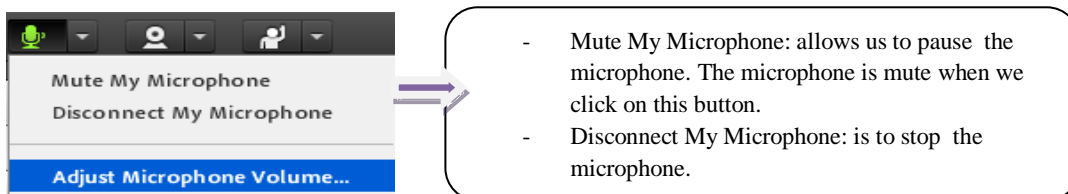


After clicking on **Next**, we see a new table with a list of microphone equipment available on the computer. We choose each item and test the microphone by choosing the input signals and then click on **Next**. To continue, we click on **Record** to see whether the microphone works or not. If the microphone is good, a blue signal runs along. Finally, we click on **Next/Finish** to finish the process of sound installation.



On the menu bar, we click on the symbol  and then the down arrow and choose **Connect My Audio**. After completing the connection, the green

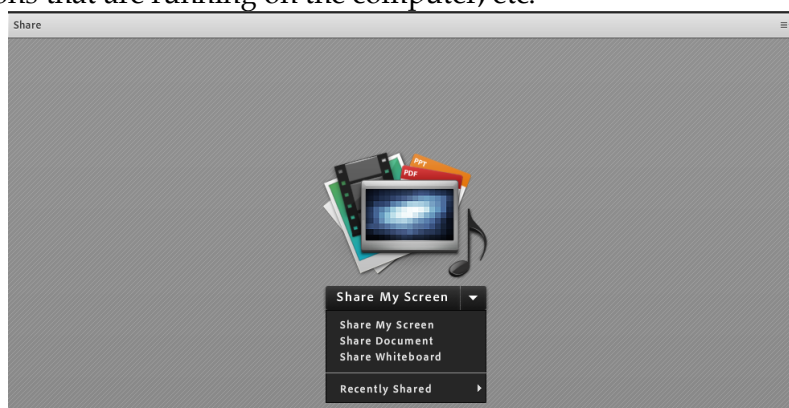
symbol appears like this: . We can speak now. If we want to adjust better, we click on the down arrow beside the green microphone symbol:



Note: whenever we do not use the microphone to speak, we have to switch it off by clicking on the button **Mute My Microphone** or when microphone symbol is green, we click on the green symbol, which means clicking on **Mute My Microphone**. The target of this function is to avoid the phenomena of howls and

echoes caused by switching on too many microphones among television bridges at the same time. At one time, there is only one television place allowed to switch on its microphone and speak. The others must switch off their microphones. Next, we adjust the sensitivity of the microphone suitably. We should not to choose the high sensitivity.

c. *resource share* : this function allows us to share files such as still images, flash video files, PowerPoint files, the backgrounds of the computer (desktop) or the applications that are running on the computer, etc.



If we click on **Share My Screen**, the system has three specific items as follows: **Desktop** (allowing us to share all the applications which are running on the computer to other television places), **Application** (Sharing the allowed applications to suitable television places while the other applications are invisible), Windows (allowing us to share the applications of the operating system.)

d. *Raise hand*: is to ask for the chairman's permission to speak. We click on the menu bar, and then we click on the symbol (**man icon**) or click on the down arrow and choose "**Raise Hand**".

e. *Discussion (Chat)*: is the same as the chat function in Yahoo Messenger.

3. *E-dictionary*: allows us to look up the meaning of English - Vietnamese mathematical words.

4. *E-check*: E-books allow us to test and assess students the same as the traditional way. First, teacher can test and assess students by observation. Teacher observes students by the function *E-forum*. From that, teacher gives the exact remarks about acts, gestures, and attitudes of students. Second, teacher can test and assess student by oral. This technique is effective. This technique assesses the expressed abilities of students such as listening, speaking, explaining, etc. Teacher can understand and help each student in the process of knowledge acquirement. Teacher asks students questions and listen to their answers via e-forum. Teacher and students must have computers and webcam to make the oral. Third, students can self-check. Students self-assess in order to develop the responsibility, the self-assessment, the independence, the confidence, and the creation of themselves. The self-check is done by stocktaking notes, ranking scales, and the answers. The self-check of students will remedy the weak points of inferiority. Fourth, teacher can test and assess students by the performance of students. Teacher allows students to use the functions of e-book to give solutions, to perform software as well as to give stocktaking notes or ranking scales on e-book. The assessment is easy and convenient. Fifth, testing

and assessment can be done by collecting students' products. E-books save the traces of students on them automatically. If we use e-books, the saving is easy. Teacher uses e-books to set up files of students. Finally, testing and assessment can be done by using questions and exercises. Questions and exercises can be used to assess learning, for example, if we define the levels of students, the compilation needs to satisfy these following requests:

+) Questions and exercises must be suitable for the program, the standard knowledge of Ministry of Education and Training, and the levels of students.

+) Questions and exercises must be stated exactly and clearly in order for students to understand exactly.

+) Besides the questions and exercises oriented to the basic requests, we need to prepare questions, deeper exercises requiring wider knowledge to encourage active thoughts.

+) Assessing results is not only giving marks, but also giving comments on the contents, forms and learning methods as well as giving aid and plans to help students.

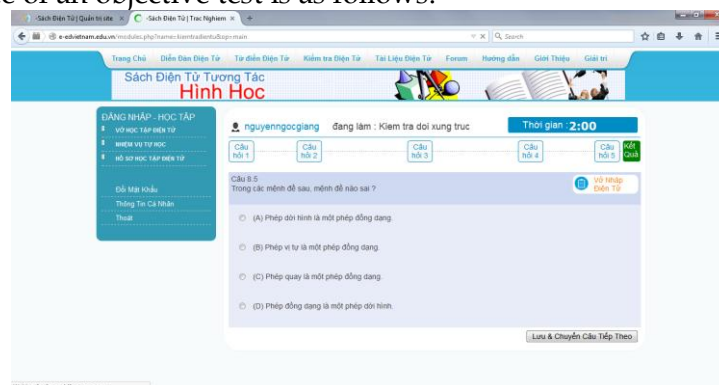
The function e-forum is designed to test and assess using questions and exercises. The use of e-forum has these strong points as follows:

+) Because e-forum decentralizes giving marks to many teachers, we can partly avoid subjective factor. E-check allows us to check, assess each student. We do not need a lot of efforts for checking and assessing writing exams. We only spend once entering data and use it for the next times.

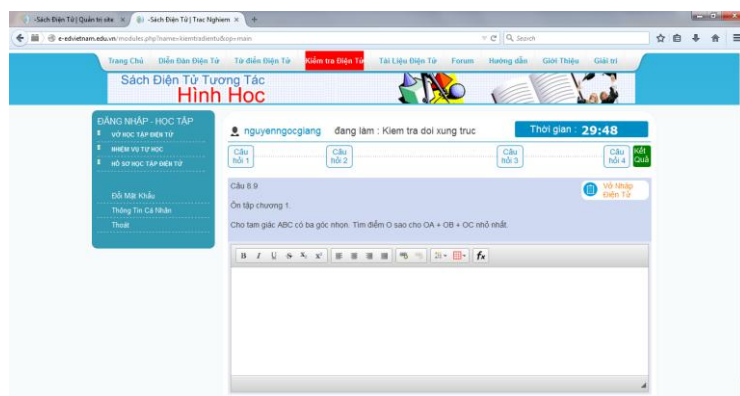
+) Besides the strong points of objective testing such as independence of the subjective ideas of teacher, assessing broad knowledge, covering all desired contents in a short time, and assessing the fast thought abilities of students, e-books also allow us to self-assess automatically. When students finish the exam, we will know the result immediately. Using questions and objective exercises to test students does not require a lot of efforts. We only enter the data once and use it for the next times.

+) We can combine writing form with oral form to test students easily.

The interface of an objective test is as follows:



The interface of a writing exam is as follows:



The check and assessment in general as well as e-check and e-assessment in particular show that the e-check and e-assessment have more strong points than the traditional check and assessment such as more objective, more convenient, independent of the number of students, learning place, learning environment, and learning time. Moreover, the storage is better. The choice of questions and answers is also as convenient as the traditional one.

5. *E-documents*: are *PDF* files, *HTML* files as well as *video* files and others of the Internet. E-files provide a document resource to discovery learning.

6. *Forum*: allows us to communicate and discuss strong points, weak points of e-books as well as gives the remedial solution to weak points.

7. *Instruction*: instructs in detail the use of e-book.

8. *Introduction*: introduces the principles and targets of e-books.

9. *Connection*: connects with the administrator of e-books.

10. *Entertainment*: includes intellectual games.

Vertical menu includes the following items:

11. *E-notebook*: E-notebook is the major part of the interactive e-book. Its content performs two functions. The first is to organize learning acts according to discovery method. The second is to organize learning acts according to divided method. In addition, E-notebook has an e-rough notebook (the GeoGebra software is embedded in the e-notebook) allowing us to draw figures, predict the result of problem, etc.

a. *Discovery learning*

Discovery learning includes the following factors:

+) A system of questions about the aware problem and solving problems through discussion.

+) With the help and instructions of teacher, students give the way of approach, survey problems and collect data.

+) Students solve problems by individual or group.

+) Finally, students exploit and develop obtained problems, perform manipulations of science thoughts.

From these factors, we see that discovery learning is divided into three various kinds:

+) Type 1: is called Guided discovery learning. Teacher gives problems and their solutions. Students find ways to explain.

+) Type 2: is called Modified discovery learning. Teacher gives problems. Students give the solutions.

+) Type 3: is called Free discovery learning. Students give problems and the solutions by themselves. (Nguyen, 2007)

b. The levels of discovery learning

There are many ways of approaching the levels of discovery learning. We can divide the levels of discovery learning based on the content and the way of approaching the content of a problem. However, we can also divide the levels of discovery learning according to the learning level of students.

Weak students

The discovery level of weak students is the simplest. Weak students only need to remember the information and events without needing to understand them.

The discovery learning acts of weak students are usually: identification, definition, name calling, writing, expressing, etc.

Average students

The level of the discovery of average students is higher than of weak students. Average students have to not only understand and explain the given information but also apply the information to new situations and events and solve the given problems.

The discovery learning acts of average students are usually: classification, comparison, ordering, reasoning, distinguishing, applying, changing, collecting, etc.

rather good students

The level of the discovery learning of rather good students is higher than the two above levels. Rather good students have abilities to divide information into many components in order to know the inner relations and their structures. In addition, students must have competence to connect pieces of information in order to create new ideas, generalize information and infer corollaries.

The discovery learning acts of rather good students are usually: analyzing, explaining, connecting, asking questions, reasoning, collecting, combining, constructing, designing, developing, integrating, organizing, etc.

Good students

The level of discovery learning of good students is the highest. Good students must have competence to identify and evaluate information, problems, things, phenomena following a specific target. Good students should know how to create problems and solve them.

The discovery acts of good students are usually: affirming, connecting, assessing, explaining, finding out the mistakes, predicting, creating, etc.

Applying e-books to teach planar geometry according to the organization of discovery acts

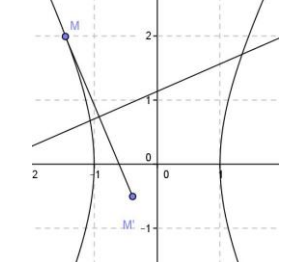
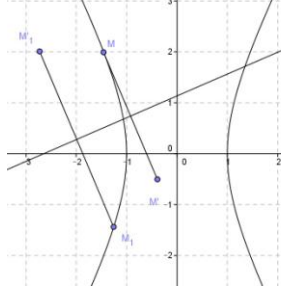
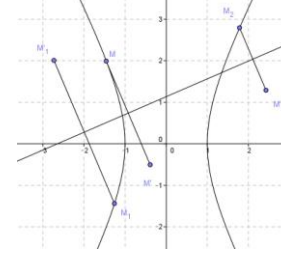
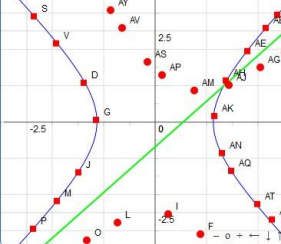
E-books allow us to teach according to the organization of discovery acts effectively with an infinite number of students. Teacher easily organizes discovery acts thanks to the page classification design of e-books. This thing is

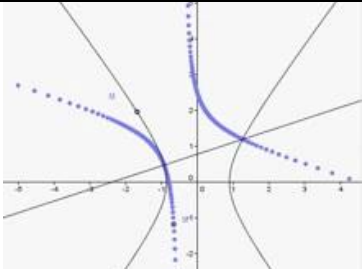
illustrated by teaching *The transformation* in the first teaching period *Introduction to transformation* of the Vietnamese advanced geometric text book 11th.

Example 1

With a given line a and hyperbola (H), for each point M on (H), let M' be a point symmetric to the point M with respect to a . Give remarks on the positional points M' when M moves on (H).

Table 3. The discovery learning of the symmetry with the help of e-books

| Levels | Learning aptitude of a student | Question content | The corresponding figure |
|--------|--------------------------------|--|--|
| 1 | Very good | Give remarks on the positional point M' when M is on the hyperbola. |  |
| 2 | Good | Give remarks on the positional points M' when points M are on the hyperbola. |  |
| 3 | Rather good | Give remarks on the positional points M' when points M are on the hyperbola. |  |
| 4 | Average | Click on the Interaction button to predict the locus. Find the locus of points M' . |  |

| | | | |
|---|------|---------------------------------|--|
| 5 | Weak | Find the locus of points M' . |  |
|---|------|---------------------------------|--|

After organizing discovery acts, teacher has students give remarks:

The symmetry on line a is a transformation that maps each point M onto point M' symmetric to the point M with respect to a .

Symbols and terms

The symmetry on line a is usually called S_a . The symmetry on a line is simply called the symmetry.

Line a is called *the axis of the symmetry*, or simply called symmetry axis.

d. The process of divided learning

Step 1: define learning strategy

The strategy here is the divided learning one.

Step 2: build the process of the divided learning

Build the process of solving problems according to the divided strategy so that its steps are as close to *an algorithm* as possible.

Step 3: predict and classify the mistakes of students

Define the expressions and causes of each mistake in order that we set up a feedback mechanism. Students can make some familiar mistakes such as calculating mistakes, logical mistakes, etc. And from that, teacher gives remedial ways as well as supplemental instructions for students.

Step 4: divide the activities of students

Divide the process of learning into *knowledge doses* to form *the program structure* and connect these knowledge doses. The doses are divided into small ones so that they can predict the thoughts of students happening at these doses based on the answer results of students. Dividing *knowledge doses* is related to the classification of the mistakes of students. The learning effectiveness is much higher if the process of divided learning is suitable to the thought level of each student. Teacher needs to give chosen tests and students will be instructed based on suitable reasoning branches. Good and pretty good students will follow the shortest branch while average and bad students will follow the longer one.

Step 5: write the chart of divided learning

E-books automatically give the chart of divided learning for each student as well as the statistical table of correct and incorrect choices immediately. This thing helps students to self-check their mistakes in solving problems.

e. Divided learning in the environment of e-books

Divided learning in the environment of e-books allows us to remedy the weak points of traditional learning. It allows us to educate an infinite number of students, not depending on learning space, learning time as well as learning place. Divided learning in the environment of e-books happens at every time, everywhere. Students are provided with feedback as well as instructions immediately. After students finish their choices, they will get a statistical chart as well as a statistical table of their choices. This thing helps students to check

their mistakes easily, and from that, students can remedy the mistakes in the next problem.

Example 2

With two given fixed points B, C on the circle $(O ; R)$ and a point A moving on this circle, prove that the orthocenter of $\triangle ABC$ is on a fixed circle.

The divided solution in the interactive e-book is as follows:

Knowledge (TT1)

| | | | | |
|---|-----------------------|-----------------------|-----------------------|--------|
| According to the hypothesis, B, C are fixed on the circle $(O ; R)$. Thus, BC is fixed. The directions of line d are a set of lines that are parallel or coincident with line d . Hence, the direction of line | | | | Figure |
| (A) AH is invariant | (B) AB is invariant | (C) BH is invariant | (D) OH is invariant | |

Branch 1 (Branch (A))

If students choose answer (A), this are correct. They continue to deal with knowledge (TT2).

Branch 2 (Branch (B))

If students choose the answer (B), this is incorrect. The system of the e-book gives the complement instruction Hd and the situations of the mistakes of students:

The complement instruction Hd

- A moves on the circle, so the line connecting a fixed point with point A always has changeable directions.
- A moves on the circle, so the orthocenter H of triangle ABC is also movable. Thus, the line connecting a fixed point with point H always has changeable directions.

| | | | | |
|--|--|--|--|--------|
| The invariant line is the line ... | | | | Figure |
| (A ₂) AB . Since AB always makes BC a constant angle. | (B ₂) AH . Since AH always makes BC a constant angle. | (C ₂) AO . Since AO always makes BC a constant angle. | (D ₂) AC . Since AC always makes BC a constant angle. | |

- If students choose answer (B₂), this is correct. They continue to deal with the knowledge (TT2).
- If students choose the answers (A₂), (C₂), or (D₂), they come back to the knowledge (TT1) to relearn.

Branch 3 (Branch (C))

If students choose answer (C), this is incorrect. The system of the e-book gives the complement instruction Hd and the situations of the mistakes of students:

The complement instruction *Hd*

- *A* moves on the circle, so the line connecting a fixed point with point *A* always has changeable directions.
- *A* moves on the circle, so the orthocenter *H* of triangle *ABC* is also movable. Thus, the line connecting a fixed point with point *H* always has changeable directions.

| The invariant line is line ... | | | | Figure |
|--|---|---|---|--------|
| (<i>A</i> ₃) <i>BH</i> . Since <i>BH</i> always makes <i>BC</i> a constant angle | (<i>B</i> ₃) <i>CH</i> . Since <i>CH</i> always makes <i>BC</i> a constant angle. | (<i>C</i> ₃) <i>BA</i> . Since <i>OH</i> always makes <i>BC</i> a constant angle. | (<i>D</i> ₃) <i>AH</i> . Since <i>AH</i> always makes <i>BC</i> a constant angle. | |

- If students choose answer (*D*₃), this is correct. They continue to deal with the knowledge (TT2).
- If students choose the answers (*A*₃), (*B*₃), or (*C*₃), they come back to the knowledge (TT1) to relearn.

Branch 4 (Branch (*D*))

If students choose answer (*D*), this is incorrect. The system of the e-book gives the complement instruction *Hd* and the situations of the mistakes of students:

The complement instruction *Hd*

- *A* moves on the circle, so the line connecting a fixed point with point *A* always has changeable directions.
- *A* moves on the circle, so the orthocenter *H* of triangle *ABC* is also movable. Thus the line connecting a fixed point with point *H* always has changeable directions.

| The invariant line is line ... | | | | Figure |
|---|---|---|---|--------|
| (<i>A</i> ₄) <i>OA</i> . Since <i>OA</i> always makes <i>BC</i> a constant angle. | (<i>B</i> ₄) <i>BH</i> . Since <i>BH</i> always makes <i>BC</i> a constant angle. | (<i>C</i> ₄) <i>CH</i> . Since <i>CH</i> always makes <i>BC</i> a constant angle. | (<i>D</i> ₄) <i>AH</i> . Since <i>AH</i> always makes <i>BC</i> a constant angle. | |

- If students choose the answer (*D*₄), this is correct. They continue to deal with the knowledge (TT2).
- If students choose answers (*A*₄), (*B*₄), or (*C*₄), they come back to the knowledge (TT1) to relearn.

Knowledge (TT2)

| | |
|---|--------|
| Since the directions of line <i>AH</i> are invariant, we use a translation of directions \overline{AH} . Because there are the only points <i>A</i> , <i>H</i> relevant to directions <i>AH</i> , we prove that \overline{AH} is a constant vector. In order to prove <i>AH</i> is constant, we prove <i>AH</i> equals to a constant segment. According to the hypothesis, <i>B</i> , <i>C</i> are fixed, | Figure |
|---|--------|

| | | | | |
|--|--|--|---|--|
| <p>so we will prove that AH equals to $B'B$ or $C'C$ and $B'B, C'C$ also have directions AH. Hence, if we construct a parallelogram $AHBB'$, BB' is a diameter of circle (O) circumscribing triangle ABC. Since</p> | | | | |
| <p>(A) line $B'B$ is perpendicular to BC (because $B'B \parallel AH$)</p> | <p>(B) line $B'A$ is perpendicular to AC (because $B'A \parallel BH$)</p> | <p>(C) line $B'B$ is perpendicular to BC (because $B'B \parallel AH$) and line $B'A$ is perpendicular to AC (because $B'A \parallel BH$)</p> | <p>(D) B', H, O are collinear.</p> | |

Branch 1 (Branch (C))

If students choose answer (C), this is correct. They continue to deal with the knowledge (TT3).

Branch 2 (Branch (A))

If students choose answer (A), this is incorrect. The system of the e-book gives the complement instruction *Hd* and the situations of the mistakes of students:

The complement instruction *Hd*

- If $\widehat{B'AC} = \widehat{B'BC} = 90^\circ$, $B'C$ is a diameter of circle (O) circumscribing triangle ABC .

| | | | | |
|---|---|---|--|---------------|
| <p>line $B'B \perp BC$, so</p> | | | | <p>Figure</p> |
| <p>(A₁) $\widehat{B'AC} = \widehat{B'BC} = 90^\circ$ (since line $B'A$ is also perpendicular to AC)</p> | <p>(B₁) $B'BFA$ is a parallelogram (F is the foot of the altitude dropped from A to BC).</p> | <p>(C₁) $B'AEB$ is a parallelogram (E is the foot of the altitude dropped from B to AC).</p> | <p>(D₁) $B'ACB$ is a parallelogram</p> | |

- If students choose answer (A₁), this is correct. They continue to deal with the knowledge (TT3).

- If students choose answers (B₁), (C₁), or (D₁), they come back to the knowledge (TT2) to relearn.

Branch 3 (Branch (B))

If students choose answer (B), this is incorrect. The system of e-books gives the complement instruction *Hd* and the situations of the mistakes of students:

The complement instruction *Hd*

- If $\widehat{B'AC} = \widehat{B'BC} = 90^0$, $B'C$ is a diameter of circle (O) circumscribing triangle ABC .

| line $B'A \perp AC$ it follows | | | | Figure |
|--|--|---|--|--------|
| (A ₂) $\widehat{B'AC} = \widehat{B'BC} = 90^0$ (since line $B'B$ is also perpendicular to BC) | (B ₂) $B'AOH$ is a parallelogram. | (C ₂) $B'AEB$ is a parallelogram (E is the foot of the altitude dropped from B to AC). | (D ₂) $B'AFB$ is a parallelogram (F is the foot of the altitude dropped from A to BC) | |

- If students choose answer (A_2) , this is correct. They continue to deal with the knowledge (TT3).
- If students choose answers (B_2) , (C_2) , or (D_2) , they come back to the knowledge (TT2) to relearn.

Branch 4 (Branch (D))

If students choose answer (D) , this is incorrect. The system of the e-book gives the complement instruction Hd and the situations of the mistakes of students:

The complement instruction Hd

- If $\widehat{B'AC} = \widehat{B'BC} = 90^0$, $B'C$ is a diameter of circle (O) circumscribing triangle ABC .

| That B', H, O are collinear is a wrong statement because | | | | Figure |
|--|--|---|--|--------|
| (A ₄) B', D, E are collinear | (B ₄) B', D, F are collinear | (C ₄) B', O, C are collinear ($\widehat{B'AC} = \widehat{B'BC} = 90^0$) | (D ₄) B', D, O are collinear | |

- If students choose answer (C_4) , this is correct. They continue to deal with the knowledge (TT3).
- If students choose answers (A_4) , (B_4) , or (D_4) , they come back to the knowledge (TT2) to relearn.

Knowledge (TT3)

| | |
|---|--------|
| Thus, B' is a fixed point on circle (O) (B' is the intersection point of the fixed line CO with O) and $B'B \parallel AH$. Translating to vector $\overrightarrow{B'B}$, we have: | Figure |
|---|--------|

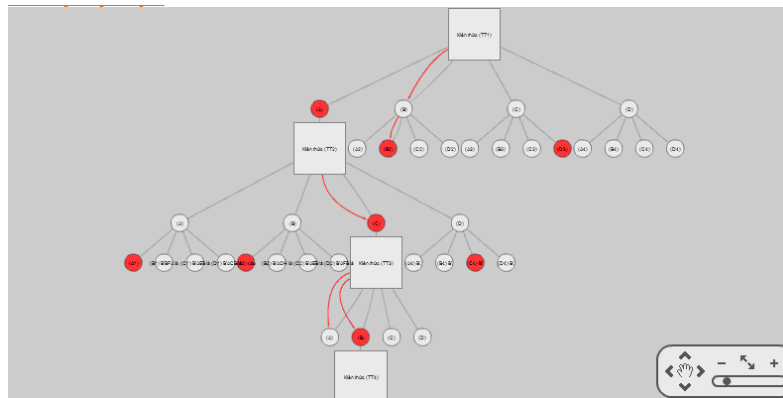
| | | | | |
|-------------------|-------------------|-------------------|-------------------|--|
| (A) $H \mapsto F$ | (B) $A \mapsto H$ | (C) $H \mapsto A$ | (D) $E \mapsto O$ | |
|-------------------|-------------------|-------------------|-------------------|--|

- If students choose answer (B), this is correct. They continue to deal with the knowledge (TT4).
- If students choose answers (A), (C), or (D), they come back to the knowledge (TT3) to relearn.

Knowledge (TT4)

| | |
|--|---------------|
| <p>Because A moves on circle (O), the locus of points H (when A moves on circle (O)) belongs to circle (O') being the image of circle (O) through vector $\overrightarrow{B'B}$.</p> | <p>Figure</p> |
|--|---------------|

After answers have been chosen, the e-book automatically gives the branches of the user's choice. Its interface is as follows:



The statistical table interface of answers is as follows:

| Câu hỏi | Trả Lời | Kết Quả |
|---------------------|---|---------|
| Kiến thức (TT1) | (B) AB là bất biến | Sai |
| Hướng dẫn hỗ trợ HD | (B2) AH . Vì AH luôn tạo với BC một góc không đổi. | Đúng |
| Kiến thức (TT2) | (C) đường thẳng $B'B$ vuông góc với BC (do $B'B \parallel AH$) và đường thẳng $B'A$ vuông góc với AC (do $B'A \parallel BH$). | Đúng |
| Kiến thức (TT3) | (A) $H \mapsto F$. | Sai |
| Kiến thức (TT3) | (B) $A \mapsto H$. | Đúng |
| Kiến thức (TT4) | | |

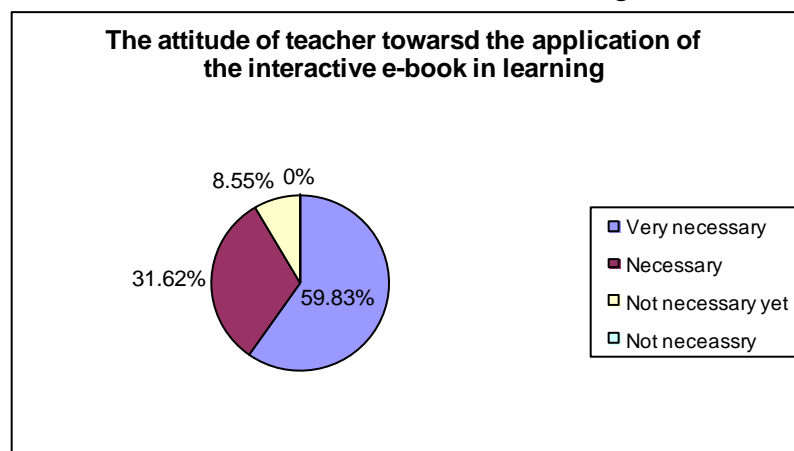
12. *Self-learn task*: the e-book gives the self-learn request and self-learn task to each student. This function is similar to the function *e-check*.

13. *E-portfolio*: allows us to record the whole learning process of users.
 14. The functions *Register*, *Password change*, *information* are the same as normal webs.

3. Results and discussion

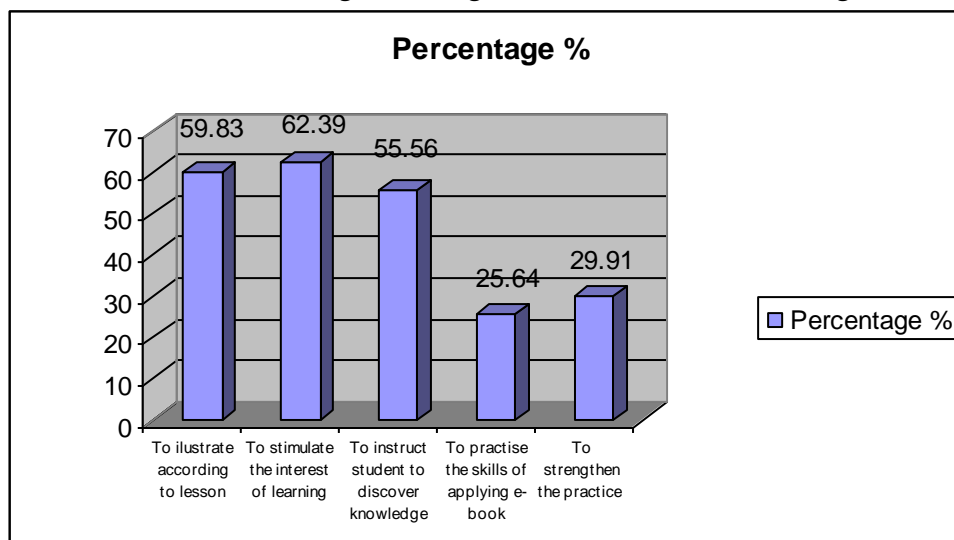
We delivered survey forms to 117 teachers of upper secondary schools in Ho Chi Minh city, Viet Nam in order to check the application of the interactive e-book in learning mathematics. The result shows that 70 teachers (59.83%) think that it is very necessary; 37 teachers (31.62%) think that it is necessary; 10 teachers (8.55%) think that it is not necessary yet; nobody thinks that it is not necessary. It shows that teachers are interested in using interactive e-book in teaching.

The chart 1.1. The attitude of teacher towards the application of the interactive e-book in teaching



We also surveyed the target of using interactive e-book in lessons. The result is as follows:

Chart 1.2: The target of using interactive e-book in teaching



Thus, the majority of teachers in the survey asserted that they had used interactive e-books to stimulate the interest of students. However, there were still many teachers using the application of the interactive e-book to illustrate their lessons (70 teachers (59.83%)). Whereas the most important target of using interactive e-books is to help students find out knowledge. There were only 65

(55.56%) teachers applying this. Besides, very few teachers (35 teachers (29.91%)) were interested in applying the interactive e-book to form knowledge, to practice skills, and to strengthen the practice of students. By observing, attending the lesson together with interviewing, we realize that there are a lot of reasons that make teachers fail to use the interactive e-book. Some teachers do not know how to use the interactive e-book. Some other teachers supposed that they were not fully equipped with informatics, so they were puzzled about teaching lessons.

We also delivered survey forms to 251 students on the application of the interactive e-book in learning. The result is as follows:

Chart 1.3. The effect of the interactive e-book on students

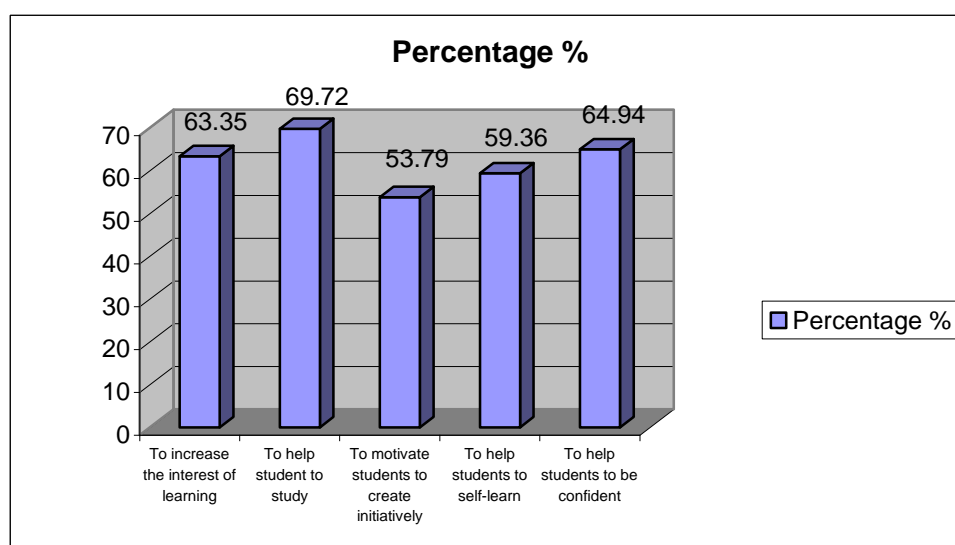


Chart 1.3 shows that students are interested in using interactive e-books in learning. There are 159 students feeling interested in learning (63.65%) and especially, 175 students (69.72%) feel that this e-book helps them to study. The interactive e-book improves students' self-learning and self-study. Students feel more confident when they learn with the help of the interactive e-book.

4. Conclusion

E-books have many strong points than other kinds of education, which are easy to use and to learn everywhere, every-time. E-books can act on-line or off-line, which allows us to e-educate, to e-exchange, to transmit images, sound, MP3, and MP4 files, or to interact, etc. In addition, e-books can be designed completely to improve the activeness of students, the classification of students, the individual learning of students in order to help the process of learning develop best. Finally, e-books allow us to educate an infinite number of students without depending on location and learning time, so they are good for learning.

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