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RESEARCH ARTICLE

APPLICATION OF “THE LEARNING CURVE” OF HERMANN EBBINGHAUS AND “THE FIRST TWENTY HOURS” THEORY OF JOSH KAUFMAN TO DISTRIBUTE TEACHING TARGETS IN SOME OF SUBJECTS AT MIEN TAY CONSTRUCTION UNIVERSITY.

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Abstract

Teaching is a process that impacts the brain of learners. In order for the teaching process to be effective, lecturers need understand the mechanism of brain activity, especially human psychology. In the history of teaching, many psychologists and educators have made the findings to help the learning process more and more complete. The following article describes some of the teaching target distributions, according to “The Learning Curve” of Hermann Ebbinghaus and “The First Twenty Hours” theory of Josh Kaufman. Structure of this article consists of two parts: The first part introduces the biography of Ebbinghaus, his learning curve theory, and the First Twenty Hours theory of Josh Kaufman; The second part discusses some of the time distribution methods for developing teaching objectives in some of subjects at Mien Tay Construction University. The Informatics specialized Architecture 1 subject is as an example. That is an example that the author has done very successfully at Mien Tay Construction University in Vietnam.

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Introduction:-

Referring to Hermann Ebbinghaus, pedagogy lecturers often talk about “Forgetting Curve” as a message: During the learning process, knowledge will be forgotten quickly if the learners do not often review their lessons. In addition, many authors in the world have continued to work on this curve of Hermann Ebbinghaus. For example, on the 100th anniversary of Ebbinghaus’s “Memory” publication occasion, Roediger re-evaluated the great achievement of this great psychologist in his article “Remembering Ebbinghaus”, through his surveys and analyses [6]. Then, Murre J.M.J. - Dros J. (2015) also analyzed a number of other versions of “Forgetting Curve” and investigated which mathematical equations matched this curve. He then concluded that “Forgetting Curve” of Ebbinghaus was actually replicated [2]...

Originally, Hermann Ebbinghaus introduced “The Learning Curve” in education and behavioral psychology. In addition, this term has also been used in other disciplines such as “Experience Curve”, “Improvement Curve”, “Progress Curve”, “Effective Curve”. In 1932, Cecil Alec Mace, an English professor, continued to examine relationship of “Forgetting Curve” and “Learning Curve” and offered a review method. This method was called “Spaced Repetition”, taking into account length of time required to study. About 15 years later, his ideas were tested on more than 3000 learners. This theory was proven to be effective in practice.

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In Vietnam, few people have referred to “Learning Curve” until “The First 20 Hours - Fast Learning Anything” book of Josh Kaufman was translated and was published in Vietnam. In fact, Josh Kaufman has also studied “Forgetting Curve” and “Learning Curve” and has made rules of his learning so fast and effective. He “quantified” “the first 20 hours”, the best learning time, when students started learning a skill or knowledge. He became very famous and his book was “the best seller”.

Research content:-

Basic content “Learning curve” by Hermann Ebbinghaus:-

Hermann Ebbinghaus (24.1.1850 - 26.2.1909) was a German psychologist who pioneered experimental research on memory and he was known for his discovery of “Forgetting Curve” (see Figure 1). In 1885, he published “Memory” which greatly contributed to experimental psychology. In addition, his works such as “Fundamentals of Psychology” (1902), “Outline of Psychology” (1908) were also very successful...

In “Memory,” Ebbinghaus introduced “Forgetting Curve”. According to this curve, memory of learner will decrease over time. In the early stages, forgetting process is the fastest. After 19 minutes, learners will forget more than 40% of their knowledge. Then, this process will slow down, from six to 31 days, knowledge retained in students in only about 20%.

Also, in “Memory,” Hermann Ebbinghaus was the first to describe “Learning Curve”. It was a curve that describes relationship between effectiveness of learning a new skill and time students take to learn that skill. This relationship was illustrated by a two-axis diagram, the horizontal axis representing “Experience” and the vertical axis representing “Learning”. Through this curve, we find that students can learn a lot of knowledge in the early hours, then slow down (see Figure 2).

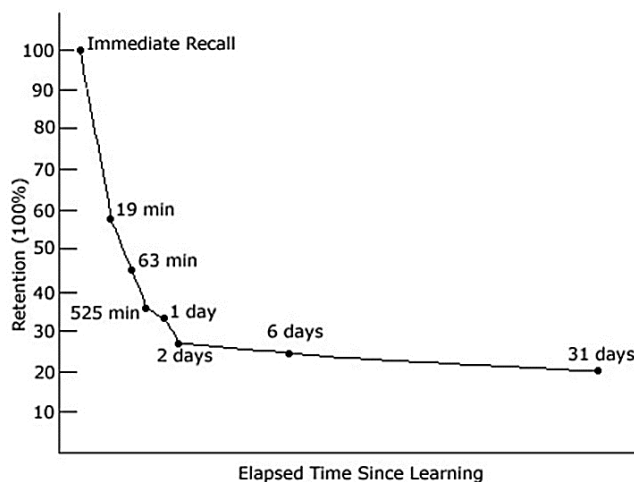


Figure 1:-“The Forgetting Curve” of Hermann Ebbinghaus.

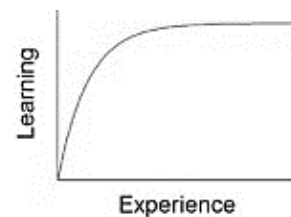


Figure 2:-“Learning Curve” of Hermann Ebbinghaus.

Today, Ebbinghaus chart becomes a way of estimating time people take to learn a new skill and to evaluate performance. In addition, when considering relationship between “Forgotten Curve” and “Learning Curve”, Cecil A.M. introduced a review method which was named “Spaced Repetition”. In this method, review time is calculated for certain incremental time periods, such as one minute, ten minutes, one day, two days, five days, ten days, one month, three months, six months, one year... Then, short-term memory changes into long-term memory (see Figure3).

Basic content “Twenty First Hours” theory of Josh Kaufman:-

Josh Kaufman, who offered ways to increase performance, was also confident in power of initial stage, proposing dividing subject into sections so that it could be easily absorbed, eliminating dispersion and concentration about 45 minutes a day, every day (see Figure 4). When we start learning something new, the first 20 hours are the most stressful and the most effective, because when we expose to new stimuli, our brains create to react to them and absorb maximum amount of information. That is why learning a new thing, no matter how complex, much of learning process happens very soon and quickly, and then slows down.

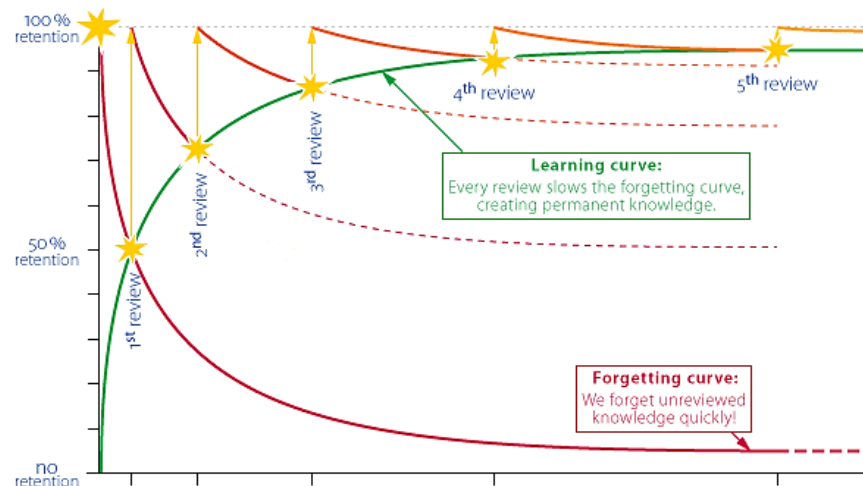


Figure 3:-Relationship between “Forgetting Curve” and “Learning Curve”



Figure 4:-Distributing “The First Twenty Hours” following Josh Kaufman.

The way of distributing teaching time following “Learning Curve” of Hermann Ebbinghaus and “The First Twenty Hours” theory of Josh Kaufman:-

Based on “Learning Curve” of Hermann Ebbinghaus and “The First Twenty Hours” theory of Josh Kaufman, the author of this article offers a way to distribute time spent teaching modules (in general) through following three steps:

In the first step, instructor determines targets to be addressed in subject and aligns those targets into groups of 16 to 20 targets, corresponding to 20 hours of student learning. Students spend one hour a day to review, five days a week, for four weeks. Targets are knowledge and skills required by course output (see Figure5).



Figure 5:-Identifying and dividing objects into target groups

Based on the actual situation at Mien Tay Construction University, each subject has a session per week, with 15 weeks per semester. Thus, each subject can be divided into two or three target groups. Each target group lasts for four main weeks and several extra weeks. During these extra weeks, lecturer does not introduce new content, but needs develop knowledge and skills for students.

In the second step, instructor develops plans according to each target group for learners to complete. In the first session of the first week, role of instructor is guiding, planning and supervising performance of students for remaining four days of the week. Every day, to the time specified, students submit their work over internet for faculty. The plan compliance of students depends on skill of instructor, for example: Instructor will add grades for assignments in time, or subtract grades for assignments not in time... The first session of second week is spent to review old lessons and a to guide new lessons for next week. Instructor needs do so until the end of the fourth week (see Figure 6).

| Week 1 | Week 2 (and 3,4) | Week 5,6,7... |
|--|---|--|
| <ul style="list-style-type: none"> • Guiding on the classroom • Homework 1 • Homework 2 • Homework 3 • Homework 4 | <ul style="list-style-type: none"> • Explaining old homework, guiding the new lesson • Homework 5 • Homework 6 • Homework 7 • Homework 8 | <ul style="list-style-type: none"> • Checking • Adding knowledge • Perfecting skills • Checking... |

Figure 6:-Implementing targets in weeks

In the third step, instructor reinforces and develops skills of students with knowledge gained in previous four weeks. This stage is long or short depending on learning outcomes, number of target groups of subject or student ability. Instructor does not introduce new knowledge but just develops content that has been implemented in the second step and assigns same exercises to students to improve their skills... Then instructor repeats above steps with next target group until the end of course.

An illustrative example of distribution of time and content in subject of Informatics 1 at Mien Tay Construction University:-

At Mien Tay Construction University, in eight training disciplines, there are seven majors with content related to technical drawing. One of the most popular engineering drawing software is AutoCAD. This is a huge and famous software from Autodesk for technical designers - as well as MS Office for office workers. Contents of AutoCAD are transferred to students under various modules depending on field of study. This article uses these contents as a prime example of applying “The Learning Curve” and “The First Twenty Hour” in teaching architecture students.

In architecture university degree, there are two modules in Architecture Specialized Informatics, which are related to use of software to support design. The Architecture Specialized Informatics 1 course has following objectives: After studying this module, students use AutoCAD software to deploy architectural design; Using SketchUp software to draw architectural plans, especially perspective drawings of projects...

The module target distribution is illustrated through following three steps:

The Architecture Specialized Informatics 1 module is divided into following two main target groups: Target group 1: Using AutoCAD for engineering design; Target group 2: Use SketchUp to design the perspective of the building. Each group has 7 weeks to work. The last week is the week for the general examination of two target groups (see Figure 7).

Step 2: For the first target group, it is organized into four smaller target groups for the first four weeks, as follows: In the first week, instructor guides theory and practice in the first session, including:

- | | | |
|-------------------------------|-----------------------------|----------------------------|
| 1. The overview of interface: | c) Windows command | a) Pan |
| a) Menu | d) Mouse state | b) Zoom |
| b) Toolbar | 2. Screen control commands: | 3. Basic drawing commands: |

- a) Rectangle
b) Absolute and relative coordinates
c) Solid
4. Basic editing commands:
- a) Copy
b) Entering coordinates by mouse direction and distance
c) Delete
d) Ortho

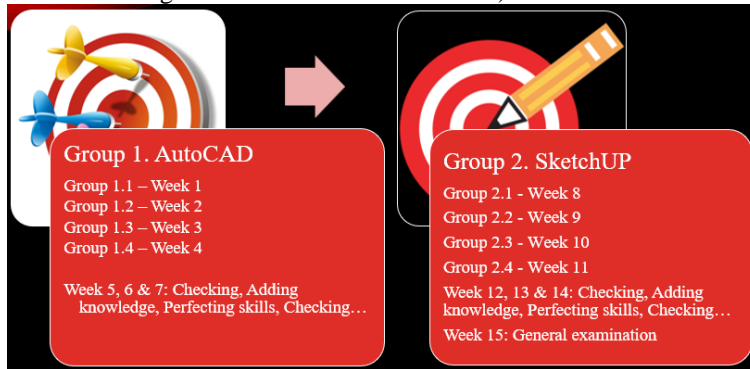


Figure 7:-Two target groups in The Architecture Specialized Informatics 1 module

5. Practical exercise: Draw the beam system plan (see Figure 8):

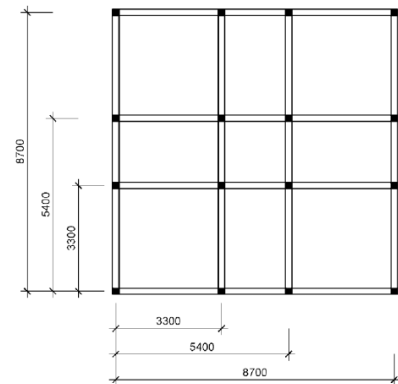


Figure 8:-Beam system plan

Then, instructor assigns students to do homework assignments, one for each day, about an hour. These exercises, students send to faculty at a specified time, over internet (the time of review is required for a specified incremental period, such as after a day, two days, five days...):

Exercise 1. Write an essay describing the interface, interface components in AutoCAD;

Exercise 2. Write an essay describing some of the screen controls, drawing commands, and basic editing;

Exercise 3. Use above commands, draw same plan, exercises similar to those taught by the teacher in the classroom with span width in two directions 3000-5000-8000 (instead of 3300-5400 -8700).

In the second week, in the first session, lecturer reviews student works and continues to implement target group 1.2, including:

1. Layer
2. Some new drawing and editing commands
 - a) Offset
 - b) Line
 - c) Trim
 - d) Undo, Redo
 - e) Automatic point snapping mode
 - f) Line type scale
3. Practical exercise: Draw the foundation plan, with following detail (see Figure 9):

At home, corresponding to each day, for one hour, students do following exercises and send them to instructor on time:

1. Write an essay describing how to manage objects by layer, in AutoCAD;
2. Students do the same exercises: Draw same foundation plan taught by instructor in classroom with two directions dimensions 100-400-200-400-100 (instead of 100-300-200- 300-100).
3. Students do the same exercises: Draw same foundation plan with the two directions size 4000-6500-10500 (instead of 3300-5400-8700).

In the third week, students do the same exercises as week 2:

In classroom, lecturer reviews student works and instructions to draw a simple home plan, with following contents:

1. Some new drawing and editing commands
 - a) Block
 - b) Array
 - c) Editing Block
 - d) Stretch
 - e) Insert
 - f) Mirror
 - g) Circle
 - h) Rotate
 - i) Move
 - j) Polyline
2. Practice exercise: Draw a house plan with door detail (see Figure 10):

At home, students do the following exercises:

1. Draw the column system, outside walls, windows for a house (see Figure 11);

1. Describe the layout on paper space or print settings in AutoCAD.
2. Draw a guard house plan in A4 paper. Then, fill materials and dimensions as shown in Figure 14.
3. Draw the plan of residential house as shown in Figure 15.

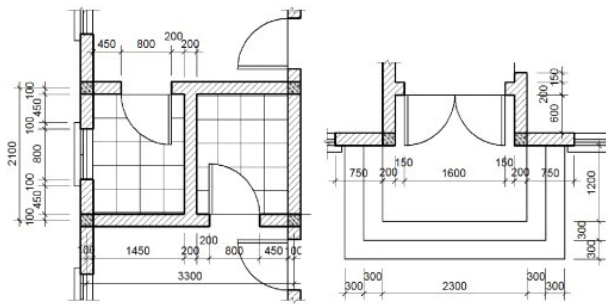


Figure 13:-House plan

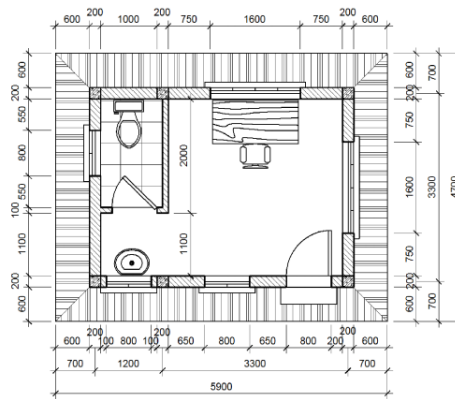


Figure 14:-Guard house plan

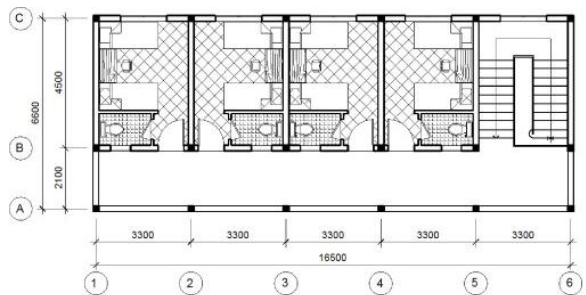


Figure 15:-Residential house plan

Step 3: After 20 hours (4 weeks) of intensive study, next few weeks are time to add knowledge and improve skills and skills for students. In week 5, 6 and 7, instructor reinforces and develops skills for students with knowledge they have learned on the last 4 weeks. At the beginning of the week, starting with a test, purpose is to help students find their shortcomings, lecturer finds problems of students to supplement, improve the knowledge that students lack, improve the skills and gives students the same skills.

Repeat these steps with the next target group until the end of the course.

Conclusion:-

The paper presents the basic knowledge of “The Learning Curve” of Hermann Ebbinghaus and “The First Twenty Hours” theory of Josh Kaufman. Besides, it is proposed to distribute content, time... for the development of teaching objectives Informatics for students of Architecture, Western University of Construction according to these theories. Through this, above contents can help lecturers to innovate teaching methods to promote positive students, especially to improve the efficiency of learning new knowledge for students in the first 20 hours.

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