Classification of Thinking Skills: A Developmental Vision

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ABSTARCT

E-learning was originally concluded as a sincere organization for partition learning and this is an e-learning explanation consistently called separate preparation, regardless of the way e-learning is a simpler thought. E-Learning is used to forward planning, preparation, and collaboration using typical electronic media regardless of, the internet, the contraption has contained a driver of e-learning and e-learning regulations affecting the factors of insight, basis and others. Audit is proposed to provide outline and examine various themes and e-learning research strategies. The size of the 3-venture audit is made from articles that are looking for and recovery, separating and regulating, and the last consideration. It was found that e-learning improved replacement insights, correspondence, school properties, basic reasoning, independent learning and additional results showed that the influence of instructor's duties and life life in further education.

Introduction and study problem

Man is distinguished by reason and understanding. Bases on this, one distinguishes the beneficial from the harmful and tries to reach a solution to the obstacles and problems of life. This is why modern education has paid more interested in programs for developing thinking among learners at all school levels (Harith Yas, Jusoh, Abbas, Mardani, & Nor, 2020). Thinking skills represent the specific processes that the individual practices and uses on purpose in information processing (Ministry of Education, 2007). Thinking skills cannot be limited to processing information only. They are broader than that, so the researcher believes that thinking skills are:

"Mental activities carried out by the individual in order to complete the thinking process and reach the desired goal. Thinking skill in its reality is a mental activity practiced by the individual at the beginning of the thinking process or during it. The goal is to reach the intended target. Table 1 shows the selected thinking skills. The classification of thinking skills may be unclear for some researchers. Therefore, the current research paper attempts to shed light on the classification of thinking skill and answer the following question:

1- What is the appropriate classification for thinking skills?
2- What are the appropriate thinking skills for the educational stages?

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The importance of this research paper is that it is in response to repeated calls for developing thinking skills of learners. The school plays an essential role in this area. It is also vital to provide a list of thinking skills, classified and distributed among the educational stages.

Methodology

the documentary method with reference to some sources and references in the field of thinking and psychology.

Answers to the paper questions
Answer to the first question

After referring to the relevant sources and references, the researcher came up with a classification of thinking skills into two types: basic and complex as follows:

Classification of thinking skills

There are many opinions regarding the classification of thinking skills, but the researcher will proceed on the classification of thinking skills into basic and complex.

Basic thinking skills

They are "a group of mental activities of less complexity; to master them is necessary before moving on to other, more complex forms of thinking, such as problem-solving and critical thinking" (Ministry of Education, 2007). They can also be defined as "uncomplicated mental activities that are the origins of thinking processes."

The researcher limited them to twenty-three skills. They also include the basic skills identified by the American Association for Curriculum and Instruction Development.

Complex thinking skills include:

Mental activities that are needed for achieving other skills. To master them, one must start from basic thinking skills. (Table 1)

Answer to the second question: Classification of thinking skills based on educational stages

The student is promoted according to the educational ladder. Each educational stage differs from the other with respect to the student's growth, as each age stage has its own characteristics and traits. There is no doubt about the importance of developing the student's thinking skills, as the student goes through the stages of growth gradually; thinking skills should be developed accordingly according to what suits his/her age group (AL MANSOORI, ALSAUD, & YAS, 2021). When classifying thinking skills in general education stages, the researcher referred to the growth characteristics of the age stages, and for scientific research in this field. Reference was made to scientific studies that talked about some kind of thinking and the effect resulting from the study on the growth and achievement of students. The researcher will refer to some vital aspects, including:

First: Characteristics of the age stages:
- One of the primary school goals is to know basic knowledge tools and language communication skills. Therefore, students are taught these at the lower levels of general education, so that they comprehend what is read, concluded, analyzed, compared, related, remembered and discussed.
- One of the primary school goals is to enable the student to perform basic mathematical operations.
- The student tends in elementary school to remember automatically.
- Among the manifestations of mental development, 6-9 years, "primary grades":
- Growth of remembrance.
- Ability to memorize.
- Increased attention to various stimuli.
- Ability to understand and focus.
- Beginning to understand some abstract concepts.
    What happens at this stage is as follows:
- Progress from simple concepts to complex ones.
- Progress from undifferentiated concepts to distinct ones.
- Progress from self-centered to abstract ones.
- Progress from changing concepts to more stable ones.
    Zahran (2005) pointed out that the child of this middle childhood stage, mental development in general continues to grow rapidly, so he/she learns basic skills in reading, writing, arithmetic, and recollection. He/She has the imagination from illusion to realism, innovation and synthesis.
In the year 7-11:
- Scientific thinking begins.
- The formal operations stage.
    The development of thinking in late childhood from 9 to 12 years:
- The development of intelligence is increased and some children at this stage are characterized by mental capabilities such as innovation
- They show curiosity and emotional balance
- Remembering is done via understanding, such as remembering days, numbers and linking them with reality.
    Zahran (2005) pointed out that the child in late childhood (9-12 years) develops intelligence and the ability to innovate; abstract thinking continues to grow; creative imagination becomes clear; he/she notes criticism directed at adults and self-criticism.
- Studies have indicated that older children at this stage convert their energies into creative activities if the appropriate environment is provided, free of restrictions and criticism (Khudhair & Hamid, 2015).

- **Middle school students**
Hamdan (2000) pointed out tha early adolescence (12-13-14 years) is characterized by a period of distinction and maturity in abilities. Mental abilities become more accurate in expression. Remembrance grows based on understanding and the conclusion of relationships (Harith Yas, Mardani, & Alfarttoosi, 2020). The ability to imagine abstractly based on words as well as abstract thinking increases. The ability to infer and conclude, judgment of things, problem solving, ability to analyze, synthesize, and generalize increases.
- He/She should develop his logical and scientific thinking skills.
- One of the characteristics of the student in the middle school is that he/she has the ability to conclude, analyze, criticize and compare.
- One of the demands of growth in the middle

stage is the development of the ability to solve problems.

- The development of desire for knowledge and the search for information.
- He/She has the ability to pay attention to the extent that he can solve complex problems.
- He/She the ability to remember based on understanding.
- His/Her process of remembering is related to previous experiences.
- He/She understands abstract concepts, principles and overall provisions.
- He/She tends to analyze logically, relate and conclude.

High school students

Hamdan (2000) indicated that a student in late adolescence (15-16-17 years) has the growth of mental abilities; innovation appears; moral memory remains at a medium stage; and abstract and innovative thinking grows.

- Scientific thinking skills.
- Tend to criticize, analyze and perceive relationships.
- Visualization is based on verbal words and images.
- The ability to understand abstract ideas.
- Innovative, scientific and critical thinking should continue to be developed.

After referring to scientific resources and studies, thinking skills can be classified based on educational stages as follows: (Table 2 & 3)

Recommendations

From the above, the researcher recommends the following:

- The importance of building codified models in thinking skills according to educational stages and repetition of experience.
- Scientific description of all thinking skills according to the school stage.
- Building educational guides and programs for teachers for the mechanism of employing thinking skills according to the educational stage.

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Table 1. **Basic thinking skills and complex thinking skills**

No.	Basic thinking skills	No.	Complex thinking skills
2.	Observation	1.	Synthesis
3.	Arrangement	2.	Planning
4.	Summary	3.	Induction
5.	Linking	4.	Deduction
6.	Goal setting	5.	Inference
7.	Comparison	6.	Forming hypothesis (suggesting alternatives)
8.	Classification	7.	Trial
9.	Application	8.	Flexibility
10.	Analysis	9.	Originality
11.	Question formulation	10.	Elaboration
12.	Data collection	11.	Invention
13.	Data processing	12.	Prediction based on premises
14.	Arranging priorities	13.	Fluency
15.	Remembering	14.	Evaluation
16.	Coding	15.	Standards
17.	Description	16.	Control
18.	Identifying errors	17.	Understanding
19.	Concentration	18.	
20.	Grasping	19.	
21.	Conclusion	20.	
22.	Evaluation	21.	
23.	Arrangement	22.	
24.	Internalization	23.	

Table 2. **classification of basic thinking skills in educational stages**

	Skill	Primary stage	Middle stage	Secondary stage
1.	Observation	√	√	√
2.	Arrangement	√	√	√
3.	Summary	√	√	√
4.	Linking	√	√	√
5.	Goal setting	√	√	√
6.	Comparison	√	√	√
7.	Classification	√	√	√
8.	Application	√	√	√
9.	Analysis	√	√	√
10.	Question formulation	√	√	√
11.	Data collection	√	√	√
12.	Data processing	√	√	√
13.	Arranging priorities	√	√	√
14.	Remembering	√	√	√
15.	Coding	√	√	√
16.	Description	√	√	√
17.	Identifying errors	√	√	√
18.	Concentration	√	√	√
19.	Grasping	√	√	√
20.	Conclusion	√	√	√
21.	Evaluation	√	√	√
22.	Arrangement	√	√	√
23.	Internalization	√	√	√

Table 3. **Classification of complex thinking skills based on the educational stages**

	Skill	Primary stage	Middle stage	Secondary stage
1.	Synthesis	√	√	√
2.	Planning	√	√	√
3.	Induction		√	√
4.	Deduction		√	√
5.	Inference		√	√
6.	Forming hypothesis (suggesting alternatives)		√	√
7.	Trial	√	√	√
8.	Flexibility	√	√	√
9.	Originality	√	√	√
10.	Elaboration	√	√	√
11.	Invention	√	√	√
12.	Prediction based on premises	√	√	√
13.	Fluency	√	√	√
14.	Evaluation	√	√	√
15.	Standards		√	√
16.	Control		√	√
17.	Understanding	√	√	√
18.		√	√	√
19.		√	√	√
20.		√	√	√
21.		√	√	√
22.		√	√	√
23.		√	√	√