

Critical thinking skills



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According to Loving and Wilson (2000), it's challenging task to making sure the students have the critical thinking skills. To Novak, learning requires 5 components which are the teacher, learner, knowledge, evaluation and context to present. Novak also mentioned that students should be guided by a good teacher through actual learning and not just by just memorizing it. A concept map is taught to the students in order to improve their cognitive skills related to critical thinking skills which are useful in various fields. The concepts map is able to improve the students' performance in the subjects requiring critical thinking skills (Daley et al, 1999). Hence, Ausubel's (1968) assimilation theory is used together with Novak's (1998) concept map in order to promote critical thinking skills among the students because the characteristics of critical thinking such as analysis, interpretation, inference, explanation and self regulation are involved in the concept development. (Vacek, 2009)

5 steps of learning process such as concept formation, subsumption, progressive differentiation, integrative reconciliation and conlidation are described in the Ausubel assimilation theory. These steps are combined to make complicated critical thinking process so much easier through the building of a concept map (Novak, 1998).

The formation of concept is divided into the primary concept and secondary concept. According to Ausubel (1968), the young children begin to recognize and label something that is regular using the language symbols and the concept formation is first occurring in them. Through observation, the young children shaped their intellectual activity and this makes up the primary concept which the example of primary concept include chair, table and cat

(Novak 1998). The secondary concept is when upon having recognized much regularity, their cognitive structures are built, and many new concepts without any visible objects are taken by the children through children. The examples are love, anger and sadness. According to Novak (1998), the learning process of adults constructing the new concepts is similar with the process learnt by a child to create meaning for words. The formation of concept is also similar with interpretation of critical thinking.

According to Ausubel (1968), the integration of the newly acquired knowledge with the previous knowledge is what known as the subsumption, a phase of learning process and meaningful learning. New content and old knowledge are linked together and this forms the assimilation theory.

In progressive differentiation, Ausubel (1998) stated that “ the natural sequence in which human beings cognitively organize and store knowledge is hierarchal from general to specific.” It is rarely used in the education which causes many students to memorize the information than having a meaningful learning process. Human mind works by taking the whole with the assimilated parts than the vice versa process. Ausubel (1998) also mention that it can be achieved by arranging the information in a hierarchal series which its from the general to the details parts in a descending manner by having subset points branching from the main points.

Integrated reconciliation is a form of analysis which it will occur when a person understands a given concept which is different but also similar to another concept. Misconceptions will happens when integrated reconciliation is not done. Newly acquired ideas are integrated and related with the

previously learned subjects. With integrated reconciliation, students will know how to interconnect his new learning and old learning through making full use of the previous learnt knowledge to support the new knowledge.

Ausubel (1968) mentioned that consolidation is done through correction and clarification and it is important to master one lesson before learning the next lesson as learning might be interrupted if a student did not master the current lesson. It's a part of critical thinking as consolidation will create opportunity for the student to self-regulate their lesson.

The combination of Ausubel's theory of assimilation and Novak's concept maps is used to promote and master the critical thinking skills. According to Novak(1998), a concept is defined as “ a perceived regularity in events or objects, or records of events or objected designated by label”. A concept map can help people to decode, interpret and categorize the problems. A concept map is started by identifying and addresses the problems on maps and later presenting it from the general into more specific concepts in a descending hierarchal manner with cross-links that portrays a connection of knowledge.

Barriers to Critical Thinking

The integration of critical thinking skills to education are often hindered by barriers or obstacles. These barriers are lack of training, lack of information, preconceptions and time constraints.

According to Broadbear(2003), the lack of training among the teachers in critical thinking methodology cause the poor the critical thinking skills among the students. The teachers don't know how to teach critical thinking
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skills although they have received the training methods and knowing the contents of the critical thinking skills.

Next, Scriven and Paul (2007) mention that the lack of additional critical thinking resources in the instructional materials as only a few instructional materials provide it. Although, certain textbooks provide chapter-based critical thinking discussion questions but however it lacks additional information.

Often, preconceptions such as personal bias about the instructional materials often inhibit and blocks the ability of the teachers and students to think critically as one of the characteristics of critical thinking skills is analytical skills which is being fair, open-minded and inclined to ask questions regarding the topics. (Kang & Howren, 2004).

Lastly, instructors have to cover a wide content within a short time period and hence, shortcuts are taken by these instructors in order to finish the syllabus. Lectures, tips or objective tests are given to the students instead of testing their analytical abilities through problem based questions. The instructors tend to focus on the content rather giving opportunities to the students to solve questions. Objective tests are given to the students as it is faster to grade than short answer questions and according to the research done, objective tests and lecturing are not the best assessment and instruction methods (Broadbear, 2003; Brodie & Irving 2007).

Critical Thinking Development: A Stage Theory

There are 6 stages in the critical thinking development. The stages start with the unreflective thinker stage followed by the challenged thinker, the <https://assignbuster.com/critical-thinking-skills/>

beginning thinker, the practicing thinker, the advanced thinker and lastly, the master thinker stage.

The first stage, the unreflective thinker stage, which the thinker lacks the awareness regarding their thinking are affecting their lives and they don't know how to apply their knowledge and regularly practice in their daily lives. Clarify, accuracy, logic, or relevance are part of the standards for the assessment of thinking of which the thinkers in this stage are unaware of. Their thinking skills may have developed but they might not realize it. Besides, problems such as prejudices and misconceptions might occur in their lives due to lack of self-monitoring thoughts. Next, graduates graduating from secondary school or college can be still in the first stage and they lack the skills to assess or improve their thinking.

The second stage, the challenged thinker, is defined when the thinkers realized and aware that thinking is part of their lives and also problems arises due to poor thinking. They are aware that their thinking has problems but unaware in identifying the problems are. Standards for the assessment and also awareness of thinking as involving concepts, assumptions and inferences are what the thinkers in this stage are becoming aware of although their understanding might be limited. The inconsistency of applying their thinking skills are making the thinkers believed that their thinking is better than it actually is.

The beginning thinker which is the third stage is when the thinkers realized the basic problems in their thinking and begin to find ways to understand and improve their thinking through modification of some of their thinking but

might have lack the systematic plans and limited understanding of deeper levels of problems. In this stage, the thinkers have enough skills to self regulate their thoughts and able to accept the critique of their powers of thought. Next, they begin to realize the needs of internalizing and using the standards for the assessment of thinking and also the role of thinking in their daily life.

The fourth stage is the practicing thinker which the thinker recognize the needs to address the problems existed the in their thinking through a systematic practice in thinking regularly and internalize them into habits. However, they lack the understanding of the deeper levels of understanding which leads to deeper levels of problems embedded in the thinking. They becoming more knowledgeable and regularly monitor the role in their thinking and also assessing their standards for the assessment of thinking. The key trait in this stage is intellectual perseverance which will become a driving force developing a realistic plan for systematic practice.

Stage five or the advanced thinker is when the thinkers are into problems at deeper levels of thought such as egocentric and sociocentric and also actively analyzing their thinking. They are able to systematically monitor the role in their thinking and regularly assess their standards of assessment. Next, the advanced thinkers are able to develop new habits of thought through the deep and systematic internalization of critical thinking. Besides, they are able to figure the strengths and weaknesses of their own thinking and systematic plans and will try to keep improving the plan.

The last stage or the master thinker stage, the thinkers are to take charge of their thinking, self monitoring, and continue to improve their own set of thinking. They are highly conscious and intuitive regarding of their own critical thinking skills through many experiences and practices. They are fairly minded and have developed new insights into problems at deeper levels of thought. To summarize, master thinkers are able to critique, consistently monitor, improving, think through complex issues with good judgment and perform effectively in everything in their lives.

Critical Thinking Cognitive Skills

According to Facione (1990), both cognitive skills and the disposition dimension are required for a good critical thinking. For critical thinking, cognitive skills such as interpretation, analysis, evaluation, inference, explanation and self-regulation are the six 6 core skills.

Facione (1990) mentioned that the panels of experts defined interpretation as “ to comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria”. Below the interpretation are the sub-skills of categorization, decoding significance, and clarifying meaning.

In categorization, it is to sort and sub-classifying information in order to understand or describe events or situations. Describing intentions, purposes and motives of a person’s facial expressions, language, signs or graphs and tables are what sub-skill of decoding significance about. Lastly, clarifying meaning is about to paraphrase or finding example which helps to explain something to other person while the meaning remains the same as intended.

Analysis is defined as “” to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions.”. The sub-skills of analysis are examining ideas, detecting arguments, and analyzing arguments. Examining ideas are about defining terms, to compare ideas or statements, and also to identify problems or issues. In detecting arguments, it’s to determine the claims or against a given opinion based on given paragraphs, statements or descriptions. In analyzing arguments, it’s about finding the main resources, background and the sub-points of the main conclusion based on given reasons intended to support some claim.

The panels of experts in Delphi study defined the evaluation as the “ to assess the credibility of statements or other representations which are accounts or descriptions of a person’s perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representation.” The sub-skills of evaluation are assessing claims and assessing arguments. The recognizing of factor which makes a person as credible witness or to determine given claim is whether true or false are what sub-skill assessing claims are about. In assessing arguments, it’s about judging between two contradict statements and also judge whether the conclusion drawn have the evidence back-up.

Inference is defined as “ to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to reduce the consequences flowing from data,

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statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.” The sub-skills of inference are querying evidence, conjecturing alternatives and drawing conclusions. In querying evidence, the information related to theory, questions, and issues is judged before it is decided. Next, multiple alternatives are create to solve a given question with a range of possible consequences, decisions and policies in the sub skill of conjecturing alternatives. Lastly, various opinions, evidences, relevant information together with one’s own opinion are required before making a final conclusion for a given problem for the sub-skill of drawing conclusion.

The last 2 core skills can enable people to think, explain their thinking and apply the critical thinking skills in their thinking thus improving themselves. In explanation, it is defined as “” to state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one’s results were based; and to present one’s reasoning in the form of cogent arguments.” The sub-skills of explanation include stating results, justifying procedures and presenting arguments. Stating results sub-skill requires a person to analyze results of which he had produced accurate statement through reasoning and state one’s research findings. In justifying procedures, a person shall record, evaluate, or justify his or her processes of solving problems based on other sub-skills and by presenting the evidences and also methodological. For example, it is used to show the steps in solving mathematical problems. Lastly, to give reasons for accepting some claims is what sub-skill presenting argument about.

Lastly, self-regulation is defined as “ self-consciously to monitor one’s cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis, and evaluation to one’s own inferential judgments with a view toward questioning, confirming, validating, or correcting either one’s reasoning or one’s results.” The sub-skills are self-examination and self-correction. In self-examination, it is based on one’s motivation, reflections, values, reasoning or attitudes to verify results produced and correcting the cognitive skills involved. In self-correction, it’s to create steps to corrects the problems that are arises when self-examination reveals errors.

Learning Theory

Behaviorism

Behaviorism is when the a person is a passive learner, which the teachers mere fill the empty minds of the students with knowledge for the sake of getting better results in the examination. It’s based on principle of ‘ stimulus-response’ which the behavior is caused by the external or environmental stimuli. The learners are extrinsically motivated by the teacher and absorb knowledge only. Correct behavior will be reinforced by the teacher through a system of rewarding and incorrect behavior by the students will be punished by the teacher. The learner is an empty vessel and the behavior is shaped through positive or negative reinforcement. Thorndike (1911)’s theory of ‘ law of exercise’ showed that a learner’s behaviors and thinking can be influenced through responses from a teacher. The thinking opportunities are limited as implicit thinking is through passive process as knowledge is obtained to exposure only.

Constructivism

In constructivism, the learners are an active learner, which they keen on experimenting with materials, objects and ideas in order to understand new information and often, they enjoy group work. The learners can develop their own personalized understandings of how world revolved around them by constructing their own knowledge and understanding. New knowledge which is obtained by learners is checked against existing self-existing knowledge. Disequilibrium might occur as newly obtained knowledge might conflict with existing beliefs and new knowledge have to be assimilated into the new knowledge. The teacher can support the development of the thinking in the learners by giving challenging problems and this enables the learners to have cognitive processing. There are 4 stages of cognitive development according to Piaget's theory. First stage, sensorimotor stage (birth to 2 year old), the infant is able to differentiate between self from other objects and able to understand how things by interacting with the environment. Assimilation and accommodation helps learning to take place. Next stage, between ages 2 to 4, preoperational stage, objects are represented through images and words as the child is able to learn to use language and also be classified in simple ways through the distinct features. The child is unable to think abstractly and needs concrete situations. Examples of abstract and concrete are justice and court. Third stage, the child is between age 7 to 11, a concrete operations stage, the child is able to think logically about objects because the child to think abstractly and conceptualize and also, the modified schemata due the object cannot be assimilated is increased due to accumulation of physical experience. The last stage, the formal operations stage, ages 11 to 15, the person is able to make deductive and hypothetical

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reasoning as his or her cognitive ability reaches the final stage and thus, the thinking is also similar to an adult in this stage. The implications of thinking are implicit thinking through assumed process and thinking outcomes by task resolution.

Social Constructivism

Social constructivism is based on the Vygostkian ideas which social interaction is important for the development of thinking and cognitive as well. In Vygostkian idea, the main concepts are the More Knowledgeable Other (MKO) and Zone of Proximal Development (ZPD). MKO is defined as a person who is more knowledgeable, better understanding, higher ability than learner regarding to a task, process and concept. The MKO can be anyone from teacher, coach, peers, younger person or computers. ZPD is defined by Vygostky (1986) as the “ the distance between the “ actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers”. An appropriate assistance or scaffolding which is given to learner for particular task will help the learner to achieve the task faster and once the learner mastered the task, the scaffolding can be removed as the learner is able to complete the task on his or her own. Language is important as it’s an important tool to put the inner thoughts and thinking into words. Vygostky also stressed that social interaction is important than development. It’s a dynamic process between teachers and learners as teacher helps to mediate, scaffold and supports thinking. The thinking is explicit as the learner is actively sharing the cognitive and collective contribution to solve problems.

Brain aspects that promote critical thinking are divided into 5 types which are the unique brain, the problem solving brain, the maturing brain, the adaptive brain and the emotional brain.

Factors that affect the uniqueness that is different in every human being are gender, exposure to abuse, specific disorders, culture and exposure to drugs, toxins or trauma. For example, a person with head trauma might have difficulty in learning compared to a person with a healthier brain.

In the problem solving brain, a person is not born with ability to solve skills as problem solving requires many skills and these skills have to be learnt by the brain. The brain will change every time a person learns a skill by reorganizing the brain mass, cortical organization and interregional connectivity. Next, new synapses are created whenever there is a new learning which has a challenging task. In addition, repetition is the key for learning new skills in the brain. The process of learning a skill should work from particular sub-skill, generalizing sub-skill and lastly to real-life experiences. There's should be a limit of interval for the training of new thinking skills. Besides, the production of new cells for learning and memory are enhanced by the gross motor activity or the movements of the large muscles of the body as the physical exercise can make reading easier to students who have difficulties in learning.

The environmental factors are directly affecting the maturation of the brain. Next, every parts of the brain have different maturation rates as brain frontal lobes may fully matured at the age of 25 to 30 as it is a slow process. The characteristics of the maturing brain are language and reading skills, social

awareness, ability to know the cause and effect and ability to make hypotheses or inferences. Poor nutrition will cause the process of brain maturation to slow down. Lastly, past and life experience will shape the neurons in the frontal lobes of the brain which is responsible for higher order thinking skills such as critical thinking skills.

The adaptive brain is when the brain is shaped through by postnatal experiences. Highly complex interaction with the environment through stimulation will help to cause the brain to be specialized and thus allowing development of thinking in the learner's brain. For example, higher SAT scores are obtained by students who are actively involved in school drama performance than the students that did not participate. It is important for the parents to let the children to play and early experiences that make them to make mistakes. Next, exceptional upbringing such as unusual mentor or parents will often results children with exceptional thinking skills. Next, nutrition also plays important roles in cognitive among the children. Lastly, opportunities should be given to the children to develop talents and abilities as its important for them to developing thinking skills.

The emotional brain relates to the ability to think critically. The emotions are always changeable due the brain's sensitivity of responding to both internal and external stimuli and the brain are consists of cooperative neural clusters activated by chemical and electrical energy. The stable states or " when neurons involved tend to coalesce into cooperative groups, self organizing in to collective behaviors" are likely to occur again at another time if the stable states of that person is long. For example, a person who is frequency afraid will enter that afraid stage, the stable state of his anytime. Hence, it's

important for the student to be taught the ability to focus to become the stable states as the ability is not innate thus for a student to think well, the ability to control emotions is important as well. Sensations, mental state, and feelings are what make up of emotional states and only one part of emotional state is what we consciously feel at the time. The ability to activate the state that is required to solve problems and suppresses the negative parts of the state is what make a good critical thinker.