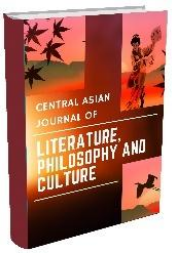


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# Developing Higher Order Thinking Skills in Learners' Through Active Learning

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**ANNOTATION**

Higher order thinking skills (HOTS) is exercised when there is an expression of concept different from the original information. It is a display of creativity based on critical thinking and sound judgement. This paper looked into how higher order thinking skill can be learnt through active learning which include think-pair-share, brainstorming, scaffolding to mention but a few. The paper posited that HOTS on its own entail holistic involvement of the students in the learning process in the classroom while they think on what they do. Higher-order thinking skills were elucidated with active learning processes mentioning on how HOTS can be learnt through active learning. Some challenges to teaching higher order thinking skills were discussed. It was suggested that it is very pertinent to plan the lessons in such a way that it will enable the use of all the taxonomic levels of remembering, understanding, applying, analyzing, evaluating and creating especially the last three that enable higher order thinking. Notable recommendations were made that measures to impact HOTS should be started from the basic levels of education and that teachers should be adequately trained on how to inculcate knowledge values in such a way that HOTS can be imparted as it is a basic requirement for the youths in the 21st Century.

**KEYWORDS:** Higher-order Thinking, Metacognition, Scaffolding, Brainstorming, Think-pair-share.

## Introduction

Higher order thinking involve conceptualizing in a different manner from how the information is delivered. The skill has to do with metacognition. When one comprehends an idea or concept, sees how it can be applied through synthesis and evaluation, and can easily draw inferences from it, we say the individual has a higher order thinking skill (HOTS). It can be seen obviously that this differs from the presentation of a concept the same way it is delivered which is called rote learning. Teachers of the 21st century should be trained

 

adequately on how to inculcate knowledge values in such a way that HOTS can be imparted as this is a prerequisite skill for the youths in the 21st Century.

According to Brookhart (2010), there are three categories of HOTS viz:

1) Higher-order thinking in terms of transfer,
2) Higher-order thinking in terms of critical thinking, and
3) Higher-order thinking in terms of problem solving.

Anderson et al (2001) differentiated between the idea of retention and transfer. The author stated that retention is when student can remember what they have learnt as it differs from transfer which is not what the student can only remember but to draw reasonable inferences and also to apply the knowledge in practicality. Transfer is the higher Order thinking skills where the knowledge is acquired and also applied in real life situations outside the classroom where the "series of transfer opportunities occurs" (Brookhart, 2010). In the critical thinking, Barahal (2008) stated that "It involves 'artful thinking', which includes reasoning, questioning and investigating, observing and describing, comparing and connecting, finding complexity, and exploring viewpoints. It refers to 'reasonable reflective thinking that is focused on deciding what to believe or do' (Norris & Ennis, 1989). Students can criticize constructively using wise judgement. All these can be acquired through active learning which has the goal of equipping students with the requisite wisdom to make sound decisions based on seasoned judgement.

In the problem-solving, Nitko & Brookhart (2007) stated "A student incurs a problem when the student wants to reach a specific outcome or goal but does not automatically recognize the proper path or solution to use to reach it. The problem to solve is how to reach the desired goal because a student cannot automatically recognize the proper way to reach the desired goal, student must use one or more higher-order thinking processes." Problem solving involves the memories of information, having a proper understanding of what is learnt, identification or formulation of alternatives, effective communication and critical evaluation of requisite ideas. Problem solving which is an integral part of active learning, is a skill that enables finding solutions that cannot be solve by employing memorization of facts. It involves understanding and ability to manipulate available facts in application. This is mostly employed in an open-ended question that have more than one solution, or the ones that the answer is not known yet or the ones that the solutions depend on the changes in the circumstances.

Higher Order Thinking skills involve:

- ✓ Concept formation
- ✓ Connection of concepts
- ✓ Seeing the bigger outcome of events
- ✓ Visualization
- ✓ Problem solving skills
- ✓ Questioning skills
- ✓ Generalization of ideas
- ✓ Analytical thinking

- ✓ Practical thinking
- ✓ Creative thinking.

According to Brookhart (2010), teaching a student in a lesson by the teacher to identify and solve a problem in the classroom or in life in general is Higher Order Thinking skill. The students solve problems set by the teacher and also the new ones identified personally, thereby creating novel solutions. HOTS can be inculcated when the students are actively involved in the learning process.

**Clarification of Concepts**

**Active Learning**

Active learning is one of the teaching styles. It is generally defined as any instructional method that engages students in the learning process requiring students to be involved in meaningful learning activities ruminating on what they do. It involves activities introduced in the classroom to the intent of catching the attention of the students. The activity of the students in active learning is contrasted with the conventional method wherein students passively or inactively get informed by the teacher.

**Principles of Active Learning**

Barnes (1989) and Chris (1992) suggested some principles of active learning:

1. Purposive: the relevance of the task to the students' concerns.
2. Reflective: students' reflection on the meaning of what is learned.
3. Negotiated: negotiation of goals and methods of learning between students and teachers.
4. Critical: students appreciate different ways and means of learning the content.
5. Complex: students compare learning tasks with complexities existing in real life and making reflective analysis.
6. Situation-driven: the need of the situation is considered in order to establish learning tasks.
7. Engaged: real life tasks are reflected in the activities conducted for learning.

**Techniques of Active Learning**

There are some techniques of active learning;

- ➢ **Think-pair- share technique.** This is a form of active learning where students form small group to study and latter share among themselves. A think-pair-share activity is when learners take a minute to ponder the previous lesson, later to discuss it with one or more of their peers, finally to share it with the class as part of a formal discussion.
- ➢ **Role playing**: A role play where students look at the topic from the perspective of a character, who will affect and be affected by a chosen topic. In role playing, students act out a situation or incident. By doing so, they gain a better understanding of the concepts and theories being discussed in class (Jennifer et al; 2013).
- ➢ **Personal response systems.** This is another technique of active learning which allows the teacher to identify the level of understanding of the student before moving on.

- **Class discussions**: A class discussion may be held in person or in an online environment. It is best that these discussions be centered on an open-ended topic (e.g. one that has no right or wrong answer).
- **Small groups**: A small group discussion is a similar activity between individuals, groups, or teams of individuals.
- **Short written assignments**: A short written exercise can be done at the end of class to look for clarity where students are asked to summarize the day's discussion in a short paper to be turned in before the end of class. This is a good way to review materials.
- **Peer review**: A peer review where students review and comment on materials written by their classmates.
- **Problem solving using real data**: students use a variety of data to explore scientific questions.
- **Just-in-time teaching**: students read assigned material outside of class, respond to short questions online, then participate in collaborative exercises the following class period.
- **Game-based learning**: uses competitive exercises, either pitting the students against each other or through computer simulations.
- **Group Simulation**: The students get engaged in simulating a real-life situation through the use of computer or Virtual reality head-set.

**Examples of active learning activities.**

This include:

- ✓ Brainstorming
- ✓ Discussing
- ✓ Micro teaching
- ✓ Journaling
- ✓ Group work
- ✓ Focused listening
- ✓ Formulating questions
- ✓ Note taking
- ✓ Annotating
- ✓ Role playing
- ✓ Scaffolding

Active learning is an inclusive learning in which students take participatory role in the process of learning. A discussion question may be given to the students which each of them can work on independently and later come on to discuss.

**Theoretical Framework**

Active learning coordinates with the principles of constructivism which are, cognitive, meta-cognitive, evolving and affective in nature. Studies have shown that immediate results in construction of knowledge is

not possible through active learning, the child goes through process of knowledge construction, knowledge recording and knowledge absorption. This process of knowledge construction is dependent on previous knowledge of the learner where the learner is self-aware of the process of cognition and can control and regulate it by themselves (Anthony, 1996). There are several aspects of learning and some of them are:

1. Learning through meaningful reception, influenced by David Ausubel, who emphasizes the previous knowledge the learner possesses and considers it a key factor in learning.
2. Learning through discovery, influenced by Jerome Bruner, where students learn through discovery of ideas with the help of situations provided by the teacher.
3. Conceptual change: misconceptions takes place as students discover knowledge without any guidance; teachers provide knowledge keeping in mind the common misconceptions about the content and keep an evaluation check on the knowledge constructed by the students.

Constructivism, influenced by researchers such as Lev Vygotsky, suggests collaborative group work within the framework of cognitive strategies like questioning, clarifying, predicting and summarizing (Rusbult 1999).

**Strategies for Enhancing Higher-Order Thinking Skills using Active Learning technique**

Blooms Taxonomy is the most widely used frame work for teacher thinking. Dr. Bejamin Bloom created taxonomy in 1956 which was meant to promote higher way of thinking in education through analysis, synthesis and evaluation. Thus, the mere remembrance of fact which is rote learning would be downplayed. He divided learning into three domains which are

- ✓ Cognitive: this has to do with mental skills of comprehension of facts it involves development of intellectual skills.
- ✓ Affective: Manipulations of emotions
- ✓ Psychomotor: Acquisition of manual or Physical Skills.

The above three domains are quite important for an educated person. Bloom listed the abilities and skills within the six categories;

1. Knowledge: This has to do with recall of data and information.
2. Comprehension: Understanding of concepts and ability to state a problem in one's own words.
3. Application: The use of knowledge acquired to solve a problem in another situation
4. Analysis: Separation of facts into its component's parts so that the organizational structure can be better understood.
5. Synthesis: Building up facts from different elements to form a new structural whole.
6. Evaluation: Making judgement about the value of facts and ideas gathered.

These steps have to be followed chronologically for effective learning to take place.

Anderson (2000), and her colleagues revisited Blooms Taxonomy in the mid Nineties making two major changes. The author also changed the six categories from noun to verbs with little rearrangements;

1. Remembering: the ability to use memories to define a concepts, recite or retrieve materials.

2. Understanding: The ability to construct meaning from different facts or materials
3. Applying: The ability to apply related information and skills.
4. Analyzing: Breaking the materials into constituent parts in order of the relations.
5. Evaluating: The ability to criticize constructively and making reasonable judgements.
6. Creating: The ability to puts different related parts together to form a viable whole.

Teachers can teach higher order Teaching Skills by employing the attitudes and preparations involved in active learning which include:

1. **Employing the language and concepts of higher-order thinking**

Teachers use of language like recall, identify examine or collate suggest to the students that they should recall some previously taught facts based on their knowledge of content. If they see words like, 'solve', 'apply' 'experiment', 'show', or 'predict', they have the understanding that demonstration of application is required. If it's a question that has to do with 'appraise', 'judge', 'criticize', or 'decide', the higher-order thinking skill they are required to practice is 'evaluation'.

2. **Planning the active learning technique of questioning and discussion time to relate to a particular higher-order thinking skills**

Adequate planning is a prerequisite for an effective teacher especially in the 21st century. Careful planning is necessary to arrange for questions asking questions that elicit higher order thinking skills. Discussions must also be planned with learning objectives as not to derail from higher order thinking. Students should be encouraged to reflect on their learning process and progress as to fathom their thinking strengths and weaknesses.

3. **Scaffolding**

Slaving (1995), posited that Scaffolding involves giving students support at the beginning of a lesson and then gradually turning over responsibility to the students to operate on their own. Students that are not initially supported may not be able to develop higher order thinking skill because they may lack the direction. Kauchan and Eggen (1998) suggest teachers should provide 'only enough support so that learners make progress on their own'. Student should not have too much or too little support as not to interfere with the development of higher order thinking skill.

Robyn (2014), in his work on skills for 21st century enumerated the propositions of the guidelines of Kaucha and Eggins (1998), as

1. Use scaffolding:

✓ During initial learning, with a variety of examples to describe the thinking processes involved

✓ Only when needed, by first checking for understanding and, if necessary, providing additional examples and explanations

✓ To build on student strengths and accommodate weaknesses.

2. Provide structured representations and discussions of thinking tasks:

- ✓ Visually represent and organise problems in concrete examples such as drawings, graphs, hierarchies, or tables
- ✓ Demonstrate how to break up a thought problem into convenient steps, using a number of examples and encouraging students to suggest additional examples
- ✓ Discuss examples of problems and solutions, explaining the nature of problems in detail and relating the worked-out solutions to the problems. This practice reduces the student's need for additional teacher assistance.

3. Provide opportunities for practice in solving problems:

- ✓ Provide teacher-directed practice before independent practice, spot-checking progress on practice and providing short responses of less than 30 seconds to any single request for assistance
- ✓ Assign frequent, short homework assignments that are logical extensions of classroom work
- ✓ Link practice in the content area to complex, real-life situations.

4. Think-Pair-share:

Student are paired into groups and different or same assignment may be given to them. The different groups take this assignments home to research on. The individuals in the different groups get some material on the topic given discuss them in their individual group, criticize themselves and come out with a position to present in the general class. This attitude build the higher order thinking skill of critical thinking and evaluation based of creativity.

**Possible Challenges**

1. **Inspiring students to be more self-directed**

Teachers face a hard time of getting students to be more self-directed. They look for a way to ease the pressure of students by keeping them interested and making sure that lesson practices and the homework delivered is fun, accessible anywhere, targeted to improve their weaknesses and ensuring that learning takes place in a more conducive, less-tense, less-pressured environment.

2. **Improving Learning Outcomes**

Designing Learning Outcomes that mean something and are an effective way to measure student potential and success is a big challenge. Meeting those learning outcomes and having solid indicators to prove this, all the while easing the paperwork and the excel sheets of the teachers have become unthinkable. Even if these are done well, teachers still don't get that 360° view of how good their students are as a whole. In addition, finding the right way to automate this process in such a way that real time results are what's needed is of prime importance.

3. **Differentiating and personalizing teaching**

What works for one student, does not work for another. Teachers have recognized this but have very few ways to test and make sure that different skill levels are being evaluated. A new wave of assessments and how teaching is conducted is important. Newer question types, media-enhanced exams and the like are what teachers are looking for; diversifying teaching and keeping it simple at the same time is a balance that is hard to find.

4. **Getting students to do their work outside the classroom**

What students do at schools is just a fraction of the effort that needs to be put in for academic success. With this in mind, teachers have the extra added pressure of having students put in the extra effort outside of the classroom. Students still have found no proper incentive to deal with this issue. Teachers are looking for a way that they can encourage students to learn while they are having fun and not making it seem like pursuing knowledge is a tedious task.

5. **Finding the time to keep up with administrative tasks**

It takes a lot of time and work to come up with curriculum, teach, be engaged with classrooms, come up with questions for assessments, spend time (and sometimes weekends) correcting and grading these assessments, and then having to spend hours filling out reports, analysis, strengths, weaknesses and other performance indicators. Teachers are looking for ways to be eased of this burden so that they can focus on teaching and promoting the importance of education and learning.

6. **Understanding Changing Technology**

With the advance of the internet and changing technology, most teacher find it hard to access easy yet effective systems and platforms to run their classrooms.

7. **Parental Involvement**

Having the parents of students informed and involved is one major area that teachers and admins are having a hard time to keep up with. Teachers are looking for an easy way to have parents be a part of their child's journey and have a good understanding of their skills and monitoring their performances on a regular basis.

## Conclusion

Teaching students actively to master Higher-Order Thinking Skills makes them to think particularly with critical assessment which invariably leads to rational judgment. It engages them intellectually and creatively thereby bringing forth novelty and resourcefulness needed so much in the 21$^{st}$ century. It is very pertinent to plan the lessons in such a way it will enable the use of all the taxonomic levels of remembering, understanding, applying, analyzing, evaluating and creating especially the last three that enables higher order thinking. The teacher may need to make novel changes to existing pedagogy in other to facilitate higher order thinking skills in the students.

## Suggestions

It is therefore recommended that;

1. Measures to impact Higher Order Thinking Skills should start in the basic schools as to facilitate novelty and creativity in the students in the later years.
2. Teachers trainees should be trained with these principles in mind to prepare them for their task in the 21$^{st}$ century classroom.
3. Practicing teachers should be re-trained through seminars and workshops to be abreast with the recent demands of the 21$^{st}$ century classroom.
4. The school curriculum at all level should be revisited to enshrine the tenets of active learning

 

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