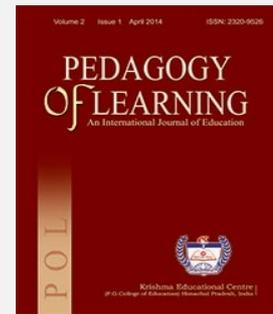


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Exploring Methods for Reflective Thinking: Synthesis of Reviews

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ABSTRACT

Reflective thinking is the capacity in which the students get the chance to consciously analysis their previous activities for improving future performance and enables the students to understand about themselves which proceeds towards self-realization & self-empowerment. Reflective thinking leads to develop other higher order of thinking/ability such as critical thinking, problem-solving ability and decision-making capacity. In view of the critical role played by reflective thinking, it is crucial for every teacher to create a meaningful learning environment which is conducive for promoting reflective thinking. Methods of teaching are important for facilitating desirable learning environment. Hence, the objective of this paper is to explore the methods for developing reflective thinking among students. For achieving the above objective, the investigator collected 13 research papers focusing on methods for reflective thinking. Out of thirteen, four methods were found which are suitable for developing reflective thinking among school students and nine methods/programmes were found for students at higher education stage. All the methods/activities have significant effect on students' reflective thinking in various stages of education.

Keywords: Reflective thinking, method of teaching, synthesis, self-realization, self-empowerment.

INTRODUCTION

Intellectual and affective behaviours are described as the process of reflection, contributing to the exploration of prior experiences to establish a deep understanding. It encourages the learner to knowingly evaluate what one has done to change his potential actions (Boud, Keogh & Walter, 2005). Reflective learning is a process that leads to reflection on all sources of knowledge (personal sources and previous experience) that may contribute to understanding the context. In a learning situation, reflection is an essential process that helps learners to make sense of their learning experience and to

create new experiences that contribute for enhancing their learning practices and success in subsequent learning. By articulating and tracking what they have learned, it helps learners to develop a deep understanding (Walters, Seidel, & Gardner, 1994). The reflective learning experiences of students will bring changes in the way they deal with their learning in the future (e.g., conviction, value) by drawing meaning from their learning experience. The process of reflection gives useful knowledge to teachers about their students such as learning style, comprehension, emotions, and the way in working on their learning tasks.

Reflective thinking falls under the higher order of skill that makes the learner critical thinker and good decision maker for life. In the academic environment, it is vital because it encourages students to judge their actions, teaches how to be self-critical, points out their faults and finds a way to solve them. The benefits for encouraging reflective thinking are: it lets students minimize repeated wrong-doing practices and optimizes learning through incentive to look back and think about the best strategies for meeting various objectives and achieving their success in that specific area; encourages students to introspect within themselves for personal progress; it is the process of self-acknowledgement which grants empowerment, so it can be considered as a gateway to self-empowerment. Reflective thinking is all about recognizing your self and that is the essential element of success and excellence (Boud, Keogh & Walter, 2005).

The idea of learning from experience is closely correlated with reflective learning. It has benefits in increasing self-awareness which is the key component of emotional intelligence and a better understanding of others. Reflective approaches have also helped to improve creative thinking, critical thinking and foster constructive involvement in the learning process (Moon, 2004). Reflective learning is a method of sense-making in which the learner builds, deconstructs and rebuilds their understanding. Each teacher/teacher-educator/instructor should explore multiple ways to have a positive learning atmosphere in which students improve their reflective thinking capacity. By evaluating the above-mentioned value of reflective thinking, psychologists and specialists have developed numerous approaches, applications and practices in the 21st century that improve reflective thinking capacity. Now the concern is to look for these approaches and their usefulness before using them for a noble cause. Research papers/articles are valuable sources where we can find different models/applications and the effectiveness of these methods have already examined by researchers. In this light, this paper aims to collect and explore certain methods or models which proved to improve reflective thinking capacity among students.

METHODOLOGY

The main objectives of this paper are to explore methods/activities/program to improve students' reflective thinking and the second objective is to define the research gaps that need to be addressed. The outcome of this paper will help teachers/audiences to familiarize themselves with multiple approaches or methods to improve their students' reflective thinking ability and also give other researchers necessary inputs to study the unexplored areas.

To achieve the above objectives, the investigator collected literature that emphasized on methods/activities/program for developing reflective thinking from different databases (ERIC, JSTOR, Taylor & Francis, Shodhganga and Springer as well as Google scholar) and journals (participatory education research, European Journal of educational research, research gate, international journal of social science and humanity, Amazonia investga, education dissertations, international journal of progressive education and American society of engineering education).

This paper has some drawbacks, as numerous studies use different methodologies to analyze reflective learning and the environment/context often varies from one study to another study to

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measure reflective learning that adds error to the execution or implementation part of methods because the social science researches are behaviour and context-specific.

REVIEWS OF STRATEGIES FOR REFLECTIVE LEARNING

The current paper is based on 13 research papers concentrating on multiple methods/activities/program to improve student reflective thinking. The investigator divided the reviews into two parts, such as methods for school students and methods for higher education students. Four studies were listed under the group of approaches intended for school students. Out of four studies, two studies are focused on methods of reflective thinking on the subject of mathematics, one is based on the method of reflective thinking on the subject of science and the last study is based on the method of reflective thinking on Islamic education. In the context of students of higher education, the investigator obtained nine studies based on methods for reflective thinking. Five studies based on the techniques to develop reflective thinking among students of teacher education out of nine studies and four studies based on the techniques to develop reflective thinking among university students. The following table depicts the detail information about the reviews.

Table 1: Details Description of Reviews

Sl.	Name of Researcher	Methods/ Program	Research Design	No. of Participant	Major Finding
1	Al Arood, Aljallad & Baioumy (2020)	Cloud-based learning program	Semi-experimental approach	96 (experimental-47 and control-47)	This programme has a significant impact in improving reflective thinking skills among 10 th grade students
2	Murphy (2014)	Reflective practice program	Quasi-experimental design	113 (treatment group-59 & comparison group-54)	The reflective treatment programme was effective for improving reflective thinking
3	Cakir, Ozen, Kaya & Buyruk (2016)	FeTeMM (Science and Technology, Engineering and Mathematics) activities	Quasi-Experimental	60 (experimental group-32 & control group-28)	The FeTeMM activities have significant impact on 7th grade students' reflective thinking skills for problem solving.
4	Yasin, Fakhri, Siswadi, Faelasofi, Safi, Supridi, Syazali & Wekke, (2020)	SSCS (Search, Solve, Create, and Share) learning model	Quasi-Experimental With 2x2 Factorial Research Design	56 (experimental group-28 & control group-28)	The application of the SSCS learning model improved mathematical reflective thinking skills.
5	Perumal & Sarvanakumar (2017)	Self-instructional modules	Quasi-experimental design (single group)	100 student-teachers	Self-instructional modules has significant impact on rational reflective thinking
6	Tican & Taspinar,	Reflective thinking-based teaching	Pretest and posttest	42 students (experimental)	Though the experimental group obtained higher mean

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	(2015)	activities	control group design of experimental research	1 group-21 and control group-21)	scores in posttest on reflective thinking than the control group but the difference was found to be statistically insignificant.
7	Tsingos-Lucas, Bosnic-Anticevich, Schneider & Smith (2016)	Reflective activities	Quasi-experimental cross-over intervention control design with repeated measures	214 undergraduate students	Integration of reflective activities into a pharmacy curriculum increased the reflective thinking capacity of students
8	Pianpeng & Koraneekij (2016)	Model of reflection using video-based on Gibbs's Cycle in an electronic portfolio	Experimental design	21 student-teachers	This reflection model by using video based on the concept of Gibbs' cycle in electronic portfolios enhanced the level of reflective thinking of teacher students
9	Hosseini, Maktabi, Yailagh & Yakhchali (2018)	Reflective thinking model	Pre-test and post-test design with one experimental group and two control groups	-	The training of reflective thinking model significantly increased the level of reflective thinking
10	Gencil & Saracaloglu (2018)	Layered Curriculum	Sequential mixed method design (pretest-posttest control group design and semi-structured interview)	74 prospective teachers	The layered curriculum is determined to have positive effects on participants' reflective thinking level.
11	Pennington (2010)	Instructional scaffolding intervention	Quasi-experimental cohort design	30 pre-service teachers (experimental group-15 and control group -15)	The instructional scaffolding intervention effectively improved reflective thinking in elementary teachers' portfolio.
12	Chen, Hwang, & Chang	Reflective thinking-promoting approach	Quasi-experiment	38 (experimental 19 &	The proposed approach significantly enhanced the reflective thinking,

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	(2019)			control 19)	
13	Van Es (2006)	Effective use of questions techniques and wait time	--	--	Effective questioning techniques and the use of effective wait time can create a learning environment where students can improve their reflective learning

SYNTHESIS OF REVIEWS

In the synthesis part, the investigator synthesized the reviews under two categories, i.e. methods for school students and methods for higher education students and both categories were synthesized again to draw the conclusions.

Four studies focusing on methods/activities/strategy for developing reflective thinking among school students were analysed. After critically reviewing the four reviews, the investigator found that reflective thinking among school students was generated by activities such as reflective journal writing, inquiring, verbal conversation, problem-solving, collaboration, teamwork and efficient communication (Murphy; 2014 & Cakir & et al; 2016). The investigator found several methods from the reviews that enhance reflective thinking, such as the SSCS (Search, Solve, Create, and Share) learning paradigm and the cloud-based learning program. In the context of SSCS learning model, there are four stages and each process has some activities such as search phase (put out the ideas to solve the problem), solve phase (utilize the thinking ability to collect data to solve), create phase (examine the results and arranged in a systematic way to bring something new) and share phase (discuss with peers and teachers to conclude the solution of the problem. The proposed application of SSCS learning model enhanced not only reflective thinking in mathematics but also significantly improved mathematical problem-solving skills (Yasin & et al (2020) Another model called cloud-based learning programme where ICT when get combined improve the level of reflective thinking of students. The tools and frameworks in this package are assembled on a virtual cloud network. The instructional practices in these programs are categorized into three categories, such as oral and written activities in the classroom, developmental activities and homework. In the evaluation process, communication evaluation strategy, observation strategy, self-revision strategy leaning process description log, as well as laptops, internet and mobile phones were used (Al Arood, Aljallad & Baioumy, 2020). Both of the models helped to improve reflective thinking among school students. Besides, it is also clear from the reviews that the important factors that self-confidence, beliefs on themselves about the ability to never give up, motivation and positive attitude to deal with the situation are the important factors that need to consider by teachers for providing a conducive learning environment to enhance reflective thinking among students (Cakir & et al; 2016, Yasin & et al; 2020).

The synthesis of nine studies focusing on models/strategies for developing reflective thinking among higher education students revealed that the desirable elements for the development of reflective thinking are the challenging situation with group activity and free learning atmosphere to evaluate the old one to establish a correlation with the current one. Van Es (2006) proposed that effective questioning techniques and the use of effective wait time would create a learning atmosphere for reflective thinking to be improved. Good questions create classroom interactive and effective use of wait time established an atmosphere of inquiry. These approaches encouraged students to think outside the textbook and to learn reflective techniques. Activities such as teamwork, debate, reflective journaling and portfolios have been used to improve reflective thinking by student-teachers (Tican &

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Taspinar, 2015). There are certain methods/strategies which empirically tested to improve reflective thinking among the students at the higher education stage. Out of these strategies, two strategies are integrated with curriculum and seven strategies followed certain steps with specified activities to develop reflective thinking among students. Two categories of methods for reflective thinking (integrated with curriculum and strategies with certain steps) are explained one by one in the following.

A strategy named reflective ability clinical assessment for self and peer was integrated with undergraduate pharmacy curriculum to develop reflective thinking. The main objective of this proposed treatment was to encourage both self and peer reflection on a task and to provide valuable counseling practice for the summative end-of-semester oral assessment. The result of the study revealed that by integrating reflective activities into this curriculum improved reflective thinking capacity of students which help students to make better-informed decisions and clinical judgments that support their future practice (Tsingos-Lucas & et al, 2016). Another application of reflective thinking was designed in such a way where the whole curriculum was divided into certain layers. This curriculum called a layered curriculum which has three layers and each layer included certain activities that address the different aspects of learning. The layers of this curriculum were divided into C, B and A layers. The layer 'C' included tasks which refer to remembering and understanding the aspect of learning (activities:-reading activities, note-taking, listening to the guest teachers and asking them questions in the classroom, literature review, preparing power-point presentations and, displaying graphics etc). The layer 'B' includes the activities which refer to applying and analyzing different aspects of learning (activities:-summarizing, calculating, writing test item, creating a concept map, preparing puzzles, analyzing test items, composing self dictionaries made up of measurement concepts). The layer 'A' included the activities which refer to evaluating and creating aspects of learning (these activities are creating the original song, prose, poem, criticizing given cases, shooting advertisement films, writing for columns professionally, preparing informative film and journal, writing research report etc). The layered curriculum significantly increased reflective thinking ability along with readiness for self-directed learning (Gencel & Saracalogly, 2018). From the above both studies, it is clear that while designing the curriculum the designer needs to incorporate certain supporting activities and techniques for teaching the academic subjects which creates a meaningful environment for developing reflective thinking capacity among students.

Regarding the models for reflective thinking, the reflection using video-based learning on Gibbs's cycle in the electronic portfolio was comprised of six phases such as description, feeling, evaluation, analysis, conclusion & planning for practice. This model is suitable for creating a meaningful and effective teaching-learning environment in which students improve their capacity to think reflectively (Pianpeng & Koraneeij, 2016). Another model named teaching reflective thinking model based on constructivism theory included teaching packages proportional to the mind tools and teaching pattern of thinking skills combined in the content to develop reflective thinking (Hosseini & et al, 2018). Similarly, the instructional scaffolding intervention was designed with the portfolio reflective writing guide to assist pre-service teachers to write reflective responses about their work. This intervention is also helpful for students to get a platform to overlook their previous activities on daily basis by writing to improve and modify further action (Pennington, 2010). In the flipped learning environment, the reflective thinking promoting approach was found effective for developing reflective thinking ability. The activities of this proposed approach are divided into three stages such as pre-class stage (Watch-annotate and summarize-questions), in-class stage (discuss-give feedback) and after class stage (reflection project). This approach also includes six cognitive dimensions and four knowledge dimensions of Bloom's Taxonomy Matrix to enhance reflective thinking with positive experiences. The reflective thinking promoting approach significantly developed not only students' reflective thinking but also their participation, engagement and outcomes in leaning design project (Chen, Hwang& Chang, 2019)

The above synthesis of the 13 studies shows that reflective thinking among students was established through some practices such as reflective journal writing, inquiring, verbal conversation, problem-solving, teamwork, teamwork, portfolios and successful communication. All the

models/strategies/activities used in this research significantly increased students' reflective thinking. These methods develop not only reflective thinking but also problem-solving ability, positive attitude towards learning, participation & engagement in the learning process, academic achievement and motivation for self-directed learning. The above synthesis of studies also helped the investigator to find out the research gaps that provide other researchers appropriate insight to investigate. The study clearly revealed that few studies have been conducted to verify the effectiveness of the reflective thinking model/strategy/program at school level and especially in the Indian context to check the reflective thinking effectiveness of the model/strategy/program.

CONCLUSION

This paper introduces the synthesis of thirteen research papers based on models/activities/strategy for improving students' reflective thinking. Out of 13 studies, four studies discuss the development of reflective thinking among school students and nine studies continue to address the improvement of reflective thinking among higher education students. The outcome illustrates that all models/activities/strategies are effective in improving reflective thinking. For making skilled and innovative learner, the teachers need to explore these methods/ strategies before using them in their classroom. This paper also highlights research gaps that need to be addressed, such as few studies are conducted related to testing the effectiveness of reflective thinking model/strategy/program at school level and another gap is that few studies are conducted in the Indian context to check the effectiveness of reflective thinking model/strategy/program.

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