

Innovative Methods for Developing Innovation Skills

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“Our future growth relies on competitiveness and innovation, skills and productivity... and these in turn rely on the education of our people.”

Julia Gillard

Abstract:

In present scenario, innovation is the need to develop our country. As Kothari commission (1964-66) also focused on innovation. According to Kothari Commission we should continuously update ourselves with the latest technology, innovations and changes that are taking place in the world. And to encourage innovations, universities and higher education institutes have to set up innovation clubs on their campus. For this there is need to develop and follow some innovative methods in teaching. To promote the innovation, government of India has set up the Atal Innovation Mission at National Institute for transforming India (NITI) Aayog with the aim to create an environment of scientific temperament, innovation, creativity among Indian students. It is a step towards new India. As we know that education is a powerful instrument to change the society and to develop our country. So, this is the need to improve the quality of education and it is depending on the quality of teachers. A qualitative teacher is who would be able to inculcate the skills of critical thinking, problem solving, creativity, communication, and collaboration in students. To develop qualitative teachers, teacher training program should be effective and based on innovative methods. Innovative methods are those, which can be inculcate innovation skills in the pupil teachers as critical thinking, problem solving, creativity, communication, and collaboration. In this paper innovative methods and innovation skills would be discussed which would be effective in Indian context.

Keywords: Inquiry based learning, jigsaw, instructional conversation, mind mapping, brainstorming method, and innovation skills

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I. INTRODUCTION

Education is an illumination. Education plays a crucial role within the lives of individual by empowering with various abilities, skills, and competencies, thus paving way for enhancing the standard of life. For future economic growth, social development and for development in all areas, innovation is must in present scenario. Today thought cut competition is going on and to survive, to stability and to improve innovation in different areas is required. Innovation should be based on future disruptive projection not on existing old assumptions. Actually, future disruptive innovations are based on imagination and existing old assumption are based on experiences. Anyone can maintain on the basis of experiences, but for the improvement or development imagination is must. Imagination is only the way to improvement and development. Thus, disruptive innovation is a technology which applications affect the way of market or industry or institution functions. There are two words agility and stability; agility will help to go ahead or to improvement or development and stability will help to maintain or manage through a process. For an example, if talked about 1900-1910 Radio was very interesting and useful innovation. At that time no one thought that radio with photo could come and in 1920 when T.V. was introduced everyone was surprised that a photo of the speaker can be seen.

Actually, it is disruptive, a 100 % change. After CRT TV (Cathode Ray Tube, Black and White TV) CRT TV (Color Cathode Ray Tube, Color TV) was introduced and then Plasma Display Panel, then Liquid Crystal Display (LCD), then Light Emitting Diode (LED) TV then Organic Light Emitting Diode (OLED) TV. This disruption came not only on TV, disruption came on the phone also. Now a day's maximum no. of application has been added in the phone to make easy human life, it is called disruption. In 1996 clock and calendar were added in a phone, then in 2002 0.3 mega pixel camera added then email added by Blackberry then in 2005 first Walkman phone introduced and in 2008 smart phone came in which internet newspaper watch TV, etc. has been included. Today in a phone many applications like clock, calendar, music, radio, movie, TV, games, calculator, email, booking, banking, shopping, web browsing, wallet, alarm, help monitoring, camera, newspaper, file manager, torch etc. has been added to make human life easy and comfortable. It is not enough many mobile applications are prepared with android to make human life easier and more comfortable. No one can believe that up to 2030 Android software will disrupt 80 % industries. Amazon, flip kart, Ola, Uber, Airbnb, Paytm, etc. these all is a software who has changed the mode of transaction and way of business.

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In this way after 20 years current skills will be obsoleted. New types of job will be introduced. Whatever is taught in schools in present scenario will not be useful after 30 years as too many changes and innovations will be introduced. Different types of printer are used like scanner, printer, colored printer, 2D printer, etc., but 3D scanner printer is the storm in printing machines. In 3D printer additive manufacturing is using. In it everything from spoons to the airplane can be scanned and in 3D form we can receive. Human being also can be scanned and can receive statue of that human being. 3D printer is used in many fields like healthcare, manufacturing, automotive, aerospace, construction, etc. Anyone can search about Additive Manufacturing 3D printing on Google. In Dubai and in China many buildings have been prepared with the help of 3D printing. It is a new innovation to save time and money. The whole world is changing rapidly. 3D printers, Farming Robots, Google driver less cars, LIDAR (Light Detection and Ranging) Technology, Artificial intelligence (AI), etc. many innovations are introduced for revolution in every field.

In ancient period, education was knowledge based in India. After some time, we start to focus on understanding and in present scenario we are focusing on application. For application of knowledge innovation skills is requirement for future growth. Education is not only for literate a person it is to inculcate some important skills in a person so that s/he would be able to survive in cut throat competitive world and gave his/her best contribution in development of his/her country. So, to achieve this main goal of education it is must to follow some innovative methods to inculcate some important innovation skills in students. In this paper first of all innovation skills would be discussed.

To promote the innovation government of India has set up the Atal Innovation Mission at National Institute for transforming India (NITI) Aayog with the aim to create an environment of scientific temperament, innovation, creativity among Indian pupil teachers (NITI, 2015). It is a step towards new India. In this innovative research skills will be explored among B.Ed. Pupil teachers and relationship with academic achievement, as innovative skills are the need for future growth and rely on the education of people which will be helpful in Atal Innovation Mission also. Well said by Winston Churchill, "Without tradition, art is a flock of sheep with a shepherd. Without innovation, it is a corpse (Churchill, n.d.)." Same in education, without education a person is useless and without innovation education is nothing.

For innovation there are required for expert in some skills. In other words, for innovation a person should have a set of some skills as for innovation a person would have to think, would search some problems and to solve problems a person would have to communicate, collaborate and critical thinking also required. And after all this some creative decisions have to take. Thus, it can be said that for innovation a set of skills is required, and that set can be called as innovative skills. To get success in future innovative skills is required in the student. Innovative skills are the group of skills which helps individuals to become innovative in what they do, and these are the combination of critical thinking, problem solving, creativity, communication, and collaboration.

In a study found that there is a positive relationship between Problem solving and academic achievement (Beyazsacli,

2016). Teachers play a pivotal role to inculcate different skills in pupil teachers at every level. Instructions to the pupil teachers in higher education through PBL (Problem based learning) and other methods facilitate deep approaches to learning and pupil teachers' achievements positively affected (Hoidn&Karkkainen, 2014). In Australia, a study on VET (Vocational Educational Training) clear that Innovation is a process of some activities with new ideas and creativity which implication helps to culminating (Mitchell, 2003). OECD (The organization for economic co-operation and development) also focuses on innovation in teaching and learning. For innovation right skills have to develop in society and schools among pupil teachers. Critical thinking, imagination and creativity skills are the right skills which would help in innovation (OECD, 2016). Innovation is very important for the stability of political and social system. For greater impact on the system co-ordination is must to relate the different aspects of the innovation. Asian countries have progressive nature of innovation and whole education system affected from them (Wong, 1974). Innovation has gravitation to congregate in a geographical area. In present scenario innovations arises and take shape quickly. In India, most innovations attempt great input of human efforts (Naik, 1974). Critical thinking, problem solving, collaboration, communication and creativity skills are the main skills to enhance the 21st century innovative skills (Payne, 2017). AACTE (The American Association of Colleges for Teacher Education) introduced some skills like critical thinking, collaboration, communication, and technology literacy are most important for 21st century knowledge and skills (AACTE, 2010). AMA (American Management Association) cleared through critical skills surveys that critical thinking, communication skills, collaboration or team building, creativity and innovation are the most required skills for the development of good workers and these critical skills can be inculcate easily among pupil teachers (AMA, 2012). Critical thinking, problem solving, communication, social skills, etc. are the important not only for teachers, important for pupil teachers also for new millennium learners in OECD countries. According to the OECD countries like Australia, Austria, Belgium, Canada, Finland, Ireland, Italy, Spain, Portugal, etc. cleared the different skills for 21st century skills and competences (Ananiadou and Claro, 2009). Problem solving, analytical thinking, communication, collaboration, creativity, ethics, action, and accountability are the most important skills for the critical 21st century skills which are the need of every student (Crockett, 2016). Collaboration, communication, ICT literacy, social or cultural competences, creativity, critical thinking, productivity, and problem solving are the main for 21st century competencies. Mostly competences like critical thinking and problem solving always associated with academic achievement (Voogt and Roblin, 2012).

II. INNOVATION SKILLS

There are many types of skills such as life skills, soft skills etc. like this innovation skills is also for the empowerment to the students with critical thinking, problem solving, creativity, communication, and collaboration.

Critical thinking

According to Lyutykh (2009) critical thinking is the right way to think. Mason, 2008 said that it is a special skill that helps to evaluate the presented reasons specially. Bowell and Kemp (2005) believe that it is an individual decision or thinking or responsibility to deal with daily life. Bullen (1998) states that it is believed whatever we do. Facion and Facion (1994) states that inductive and deductive reasoning, analysis and evaluation are included in critical thinking. Thus, there are many statements about critical thinking.

Critical thinking is that skill which helps an individual person to think positively in daily life situation and achieve successes. It is must go ahead. For critical thinking, perception, assumptions, emotions, logic and implications and consequences are required. Without perception, assumptions, emotions, logic and implications and consequences we cannot go ahead or cannot get success. We can say that to think positively in daily life and to get success critical thinking is required. Critical thinking is given by Socrates and recorded by his pupil Plato. He focused on perception as without it we cannot analyze the basic concepts. He asked many questions which known the best way of critical thinking strategy today. Through questioning, he made the people curious to know the need of thinking for clarity and logical consistency. He helped the people to reveal their irrational thinking or lack of reliable knowledge so that they start to think critically. Socrates's pupil Plato gave the name Critical Thinking to the teaching of Socrates.

Problem solving

According to Gagne (1985) the central goal of education is to empower the people to think and use that thinking in solving daily life problems. Problem solving is the higher order of thinking such as "Visualization, association, abstraction, comprehension, manipulation, reasoning, analysis, synthesis, generalization—each needing to be managed and coordinated" (Garofalo & Lester, 1985).

It can be said that problem solving is a process in which a person first identify the problems on the base of thinking level then explain and present that how to be solved and after this planned to solve the problem and collected the information. According to priority resources would be selected and used. Then follow up would be done and then evaluation. To know that problem has been solved or not. Thus, it is a process and could be developed by practice.

Creativity

Creativity attracts the attention of experts and responsibilities so that they use it for their planning and working, according to the report of Sursock et al. 2007 from European University Association. San'chez-Ruiz (2011) stated that creativity is a multidimensional phenomenon consisting of personality characteristics, cognitive methods, capacity, and motivation. And it has appearance in social relationship or individual. Simpson (2012) says that it is as human mental capacity which helps to use their thinking and give opinions.

It can be said that problem solving is a process in which a person first identify the problems on the base of thinking level, then explain and present that how to be solved and after this planned to solve the problem and collected the

information. According to prioritize resources would be selected and used. Then follow up would be done and then evaluated. To know that problem has been solved or not. Thus, it is a process and could be developed by practice.

Thus, creativity is the heart of innovation which helps the students to apply their imagination, to develop ideas, questions, hypothesis, experiments and evaluate them with own and peer groups ideas, products, and processes. It generates the ideas, which have value to the individual, curiosity, motivation, confidence, and imagination which help to generate new product, rules and regulation or we can say innovation.

Communication

Communication is a process which helps to express views, thoughts, and experiences to others. It has many ways like verbally, non-verbally, written, face to face communication etc. Thus, it is a process of receiving and sending the information. Without communication no one can achieve goal, success, or anything.

Collaboration

Schrage (1995) states that collaboration is group of value creation, as "the process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own." Schrage (1995) describes thirteen ingredients which influence collaboration those ingredients are related to human factors. Collaboration is a way to work together to produce successful outcomes. In this two or more people interact to complete specific task. In this people learn about social behavior as they work together in same situation and to achieve same goal.

III. INNOVATIVE METHODS

Thus, all above five skills are the group of innovation skills. To improve all these skills in student innovative methods should be used. Without destroying the objectives any method that serve educational purpose could be considered innovative methods. Innovative methods give wow to the students. As very well said by Confucius:-

"I hear and I forget. I see and I believe. I do and I understand."

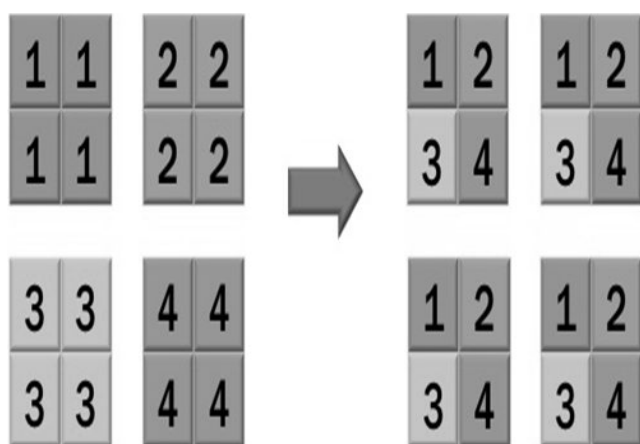
Inquiry based learning



To get the attention, curiosity, interest, participation, and passion of students it is must to engage the students. To engage the student inquiry-based learning is a good method for innovation.

In this method a task or problem is given to the students. Students complete that task and inquiry-based questions are asked by teacher. In this method students construct their own definitions. It allows the students to deep and wide study about that topic. As in traditional teaching students are instructed to listen more than asking questions and are expected to give answers asked by the teacher. Like traditional teaching inquiry-based teaching works. Teachers facilitate the students to study deeply and widely to complete that task or question and after completing that task students are expected to give answers about that task.

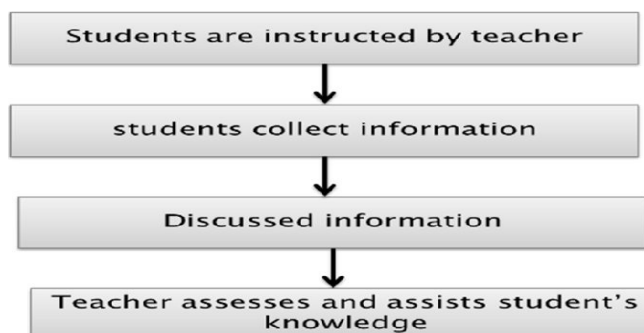
Jigsaw



It is a tried and trusted method to inculcate collaboration, communication and problem solving etc. skills in the students. It helps students to create their own learning and present own learning in front of others.

In this method students are arranged in groups and distributed a specific task or topic to each group. Every group collects information and learns about that topic. In this process students become expert of their topic. After gaining complete knowledge each member of every small group shares knowledge to another group. This method gives motivation to students to create own learning and to share knowledge with others. Thus, students engaged and motivated to learn their self, create own knowledge, understand that topic and share that knowledge with others.

Instructional conversation

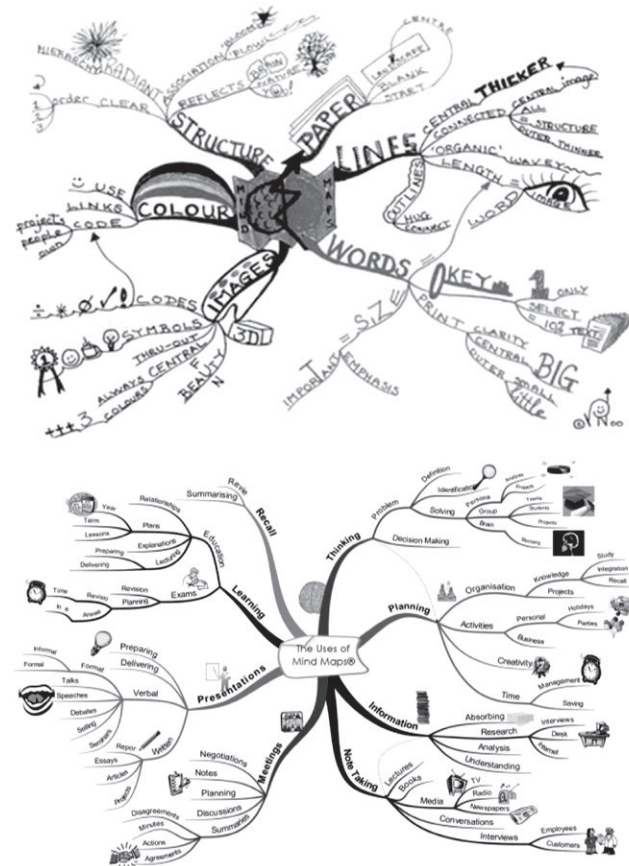


In this method students are instructed to gain knowledge on specific topic. According to instruction students collect the information and discuss that in group or in the classroom. Teacher assesses their knowledge through questions and assists them to understand the various aspect of that topic.

In this way students collect the information on their own efforts and enhance knowledge, learn social behavior through conversation and discussion, among others.

Mind mapping

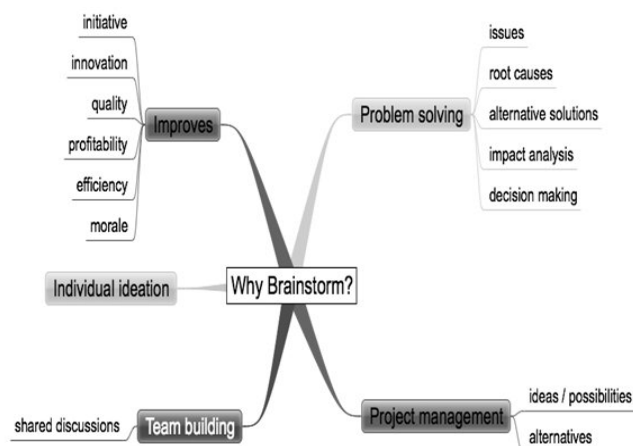
Mind mapping is a method of presenting topic through a map like road map with the help of different colors, images and words which helps the students to understand the topic forever. It is a visual presentation in which left and right both side of brain are used to improve verbal, logical and visual abilities in students. The left side of our brain works for words, logic, lists, analysis and numbers on the other hand right side of brain works for rhythm, imagination, colors, images, dimension and day dreaming.



It helps students to organize ideas, to understand the topic in a better way, to enhance creative thinking, in making notes, improve collaborative skills, in learning new materials, in tracking progress and improve reading comprehension. In it center part of a map is used for the main topic or subject. From central image main themes radiates and branches hold the key word/image. Like these small branches are connected in the form of structure.

This method is used in lesson preparation, delivering lesson, curriculum planning, creating handouts, encouraging discussion and independent thought, student assessment and self-evaluation

Brainstorming



It is a method to encourage students to focus on topic and contribute ideas without any hesitation. In this method first of all a problem or a topic is presented in the front of students and their view or ideas are welcomed without any discrimination. Thus, maximum numbers of ideas are collected from all students. Like this problem-solving skills, critical thinking and communication skills are developed.

It helps the students to focus and give attention on a particular topic, generate ideas, tech acceptance and respect for individual differences, encourage taking a risk in sharing their ideas and opinions, generate confidence that their knowledge and abilities are valued and accepted, provide an opportunity to share ideas. It is a great method to start a class and gives idea to the teacher that what students already know and where are gaps in understanding the topic to be covered. It is also promoting the feeling of unity in diversity.

IV. CONCLUSION

In present scenario, to improve the quality of education it is must to follow innovative methods so that innovation skills would be developed in students for innovation. Inquiry based learning, jigsaw, mind mapping, instructional conversation and brainstorming are the innovative methods. By using these methods in teaching, a teacher would be able to inculcate critical thinking, problem solving, creativity, and communication and collaboration skills in students. Critical thinking, problem solving, creativity, communication and collaboration skills are the group of innovation skills. Innovation skills help the students to produce something new as innovation is the demand of present scenario.

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