



Encouraging Creativity and Innovation in Education

KEYWORDS

Innovation, Creativity, School, Knowledge, Teaching.

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ABSTRACT *In countries like India the education system is heavily loaded towards memorizing in order to obtain higher grades in the examination. There is tremendous pressure of parents on students to score higher marks in the examination which has resulted in different methods of coaching by teachers. It is important for educators to have clear understanding of creativity so that teaching methods are modified to enhance it. In this paper first the relationship between creativity and innovation with knowledge and learning is established. Later few methods are suggested for providing space for students in their curriculum to develop creativity. One of the suggestions is that at least one period per week can be devoted to "teaching beyond curriculum". In this period students may be asked to decide themselves what they will like to do in one year or in one semester. This project may involve anything like writing poetry, news report, scientific fantasies etc.*

Introduction

Creativity refers to the invention or origination of any new thing (a product, solution, artwork, literary work, joke, etc.) that has value. Creativity may be defined as 'idea generation'. Being creative is to be able to generate or to come up with ideas or even to gather ideas. The new idea can be simple or it can be complex. Retrieved from <http://www.yim.my/index.cfm>. Innovation is the production or implementation of ideas. The National Innovation Initiative (NII) defines innovation as "The intersection of invention and insight, leading to the creation of social and economic value". Retrieved from <http://www.creativityatwork.com>. Creativity is a multidimensional phenomenon that manifests itself in many fields and contexts, from arts and crafts to design, science, research and entrepreneurship. It is regarded as a cognitive ability, but – though intelligence favours creative potential – it is not the same as 'intelligence'. (Florida Richard 2004) *ibid*; Boden Margaret (1990).

Creativity and innovation have strong links with knowledge and learning. It is therefore, important to provide opportunities from school level itself for encouraging creativity. This work emphasizes the need to encourage the development of pupils' and students' creative and innovative potential for several reasons:

1. The upsurge of new media and technologies that learners use in their everyday lives can be exploited in creative and innovative ways and contribute to formal and informal learning.
2. The immersion in this media-rich environment leads new cohorts of students to learn and understand in different ways, and therefore teachers need to develop creative approaches and find new methods, solutions and practices to grab their attention.
3. Creativity is a form of knowledge creation; therefore stimulating creativity has positive spillover effects onto learning, supporting and enhancing self-learning, learning to learn and life-long learning skills and competences. Retrieved from ftp://139.191.159.34/pub/EURdoc/JRC52374_TN.pdf.

The process of learning

Learning constitutes three parts: (i) Memory (ii) Understanding (iii) Concept.

The application of all three ways of learning constitutes wisdom formation. Wisdom means use of knowledge especially when the individual is encountered with some real world problems. In learning through memorization, some parameters have to be remembered, for example, copper is good

conductor of electricity or heat. When a person has been caught in electric shock, what should he do? If he has been earthed somewhere and if he leaves the earth by jumping he will get rid of electric shock.

Now the question arises whether the boy should be given a shock to make him realize or should the experiment of Faraday cage be demonstrated. But this is practically not possible in all the schools. The best way is that the teacher should tell the students that a lot of birds sitting on a live electric wire do not get electric shock by wire because their body is not earthed. The moment the electric pole and wire both are touched simultaneously the bird would be electrocuted.

For self learning, exposure is essential. Generally, innovation and creativity cannot be achieved by sitting and thinking at one place. Some strategies should be followed by educational system to develop creative and innovative ideas among students.

In Indian education system, students are only capable of pushing each and every line in the book to their mind, but when they are asked to put that into practice they just stand and shiver. For example, it's very easy to read all the parts of a machine and say it again when they are asked orally, but when they are given with a machine and asked to name the parts then generally they are not able to do that.

For example, teachers can encourage creativity and innovation in the subject of Geography, by using a globe instead of giving a paper for marking the location of the country; a plane globe should be given and student should be asked to draw a location on the blank globe. Through Astronomy, it is an established fact that altitude of a polaris star is the latitude of that place in northern atmosphere.

Learning by doing

This method can be adopted to encourage creativity and innovation in education system. The subject of pure sciences and social sciences give the abstract principle. The Engineers and managers exploit these principles to solve problem of real world, and are most of the time giving a product which fulfills a human need and makes the life easy.

Innovation in teaching and learning aimed at development of creative and original thinking skills are rare. Students should be encouraged to think in different ways for a given problem and must apply permutation and combination to see the cause and its effect for a particular problem. For example, a bulb is glowing at a particular voltage of 12V, so pure sciences tell that if resistance of the circuit is increased, the glow of

bulb reduces. If students themselves connect a bulb in series they can see the effect.

Similarly, in another example if a torch is not glowing properly and its light is dim then the possible reasons for low intensity of light may be the following:

1. The battery of the torch has become weak. This possibility may be ruled out by replacing the old batteries with new ones. And if the torch still does not glow properly, it would mean that this hypothesis is wrong.
2. Another reason could be that the resistance of the circuit has increased. This may be because of corroded terminals of the battery which may be cleaned and Vaseline may be applied. So if torch starts glowing even with the older batteries, this would indicate the correctness of the hypothesis.

There is very little focus on application of knowledge and development of relevant practical skills. Direct teaching method discourages student's curiosity, questioning and innovation. Therefore, only after giving such examples in the lab, Ohm's law may be taught so that students can have clear concepts about relationship of voltage, current and resistance. In this way student will get the knowledge of abstract, relevance and skill development.

Steps for encouraging creativity in class rooms

Students will be more motivated to work on projects they have chosen for themselves. Practically, teachers will need to define the problems some of the time. However, if students have practice with problem finding, and define at least some portion of their own challenges, motivation and creativity can be enhanced.

(Sternberg's 1996) "How to Develop Student Creativity" lists 25 steps that can promote creativity in classroom.

Table 1 25 steps to promote creativity in classroom

Using just a few of these 25 strategies based on the investment theory of creativity can produce results in yourself as well as in others. Although we present the strategies in terms of teachers and students, they apply equally to administrators working with teachers, parents working with children, or people trying to develop their own creativity. The strategies are easy to use and are outlined in Table 1.

The Prerequisites 1. Modeling Creativity 2. Building Self-Efficacy Basic Techniques 3. Questioning Assumptions 4. Defining and Redefining problems 5. Encouraging idea generation 6. Cross-Fertilizing Ideas Tips for Teaching 7. Allowing Time for creative Thinking 8. Instructing and assessing Creativity 9. Rewarding Creative Ideas and products Avoid Roadblocks 10. Encouraging Sensible Risks 11. Tolerating Ambiguity 12. Allowing Mistakes 13. Identifying and Surmounting Obstacles	Add Complex Techniques 14. Teaching Self-Responsibility 15. Promoting Self-Regulation 16. Delaying Gratification Use Role Models 17. Using Profiles of Creative People 18. Encouraging Creative Collaboration 19. Imagining Other Viewpoints Explore The Environment 20. Recognizing Environmental Fit 21. Finding Excitement 22. Seeking Stimulating Environments 23. Playing to Strengths The Long-Term Perspective 24. Growing Creatively 25. Proselytizing for Creativity
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(Nickerson 1998), (Cropley 2001) and (Piiro 2004) mention multiple idea-getting techniques which include brainstorming and divergent thinking methods and other instructional approaches to increasing creativity.

The role of teachers

The role of the teacher within and outside virtual spaces is important in teaching students how to be creative and innovative. It is unfortunate that in education sector, majority of

the teacher opt for primary and secondary level teaching as a job and not as a hobby. Teachers themselves have very poor exposure in the area of science and technology. Most of the time students are afraid of doing any new activity in the class or in lab which is not told by the teacher. And if he or she indulges in that activity, and things go wrong then students are generally fined or punished. Teachers must support learners in taking risks and in making mistakes in a non-threatening environment.

Students should be encouraged to perform more and more new activities and they should also be told that experimental kits are generally working on 12V d.c. or less which is not fatal to human life.

Teachers should also encourage students to inculcate reading habits like newspaper, catalogue and instructional manual. In addition to that every city should have scientific library, technological park, hobby centre and skill development centre at minimal charges so that students of lower and middle class family can also gain knowledge by visiting these centers. These visits may be organized by their respective schools. Persons working at these places should be mentally and behaviorally involved in this instead of taking their duties as job only.

Observations and discussion

This paper is based on the following work which is based on a survey that was carried out especially for this study. The survey has been conducted among the students of senior secondary school, which includes both boys and girls of science stream. Survey forms were critically analyzed and results have been compiled. It has been found that for each question, the percentage of students who support and understand the importance of creativity and innovation in education are given in Table 2.

Table 2 Observations of questionnaire

Question No.	Percentage of NO	Percentage of YES
Q1	9.166	90.84
Q2	29.166	70.834
Q3	15.833	84.166
Q4	52.5	47.5
Q5	30	70
Q6	41.666	58.333
Q7	16.666	83.333
Q8	9.166	90.84
Q9	25	75
Q10	5	95

The survey results reveal the following:

1. The 90.84% students, as shown in Figure 1, have strong opinion that the teachers can play key role in promoting creativity and innovation in Indian education system.

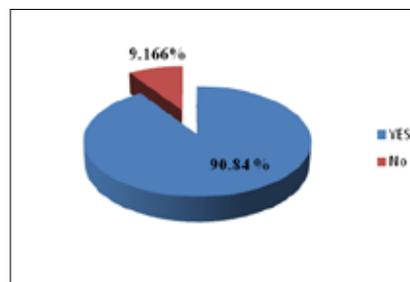


Figure 1 Role of teachers in creativity and innovation

In order to do this, teachers need to generate ideas using a variety of techniques. For example, multimedia technologies can be used to support a range of creative activities. A number of tools are also available that enable quicker authoring, more immediate interaction with students and new ways to represent ideas. Further, teachers can encourage students to use technology so that:

- Learners can develop ideas in a range of ways, using animation tools, simulations and multimedia presentations. This can support imagination and exploration of concepts and ideas.
- Learners can be connected to a range of experts and resources, in and out of the classroom by using search engines to find new information to support and develop their own work.
- Collaboration with other learners in and outside of the classroom through shared authoring and networked technology.
- Publishing to a range of audiences and receiving feedback to inform that future practice is more accessible through the use of video conferencing, emails, blogs and wikis. Retrieved from <http://www.innovativeteacher-toolkit.com/documents/skills/creativity.pdf>

2. Rising demand of coaching centers may be one of the reasons which kill the creative power of the students. Survey analysis shows in Figure 2 that 58.33% students do agree with the fact. It is a well established fact that coaching centers are ruining creative mind of children even then teachers in schools and colleges encourage student to study in these coaching centers also, parents tend to send their wards to these centers, so that their children can score better.

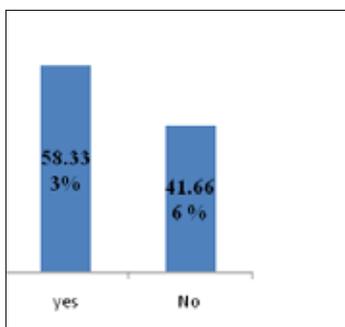


Figure 2 Coaching kills creative power

3. The 83.33% students have also reported that teachers should make study environment in such a way that children start thinking not only mugging up their lessons as a burden on their heads.

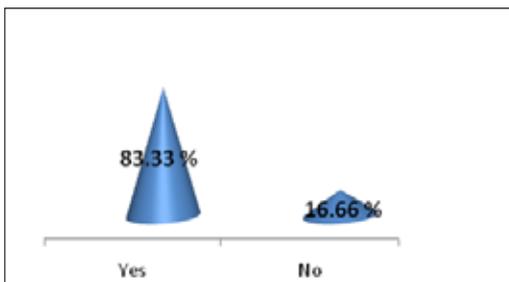


Figure 3 Start thinking and not mugging up lessons

Authors think that Indian education system need to get a bit modified both from the side of institutions, parents and governments. This is because as compared to other foreign countries, our country lags behind because of the burden that is put on a student i.e. the vast portions have to be read for the finals and hence "Mug up the content --- no need of the concept" is happening in our school level system. Instead of gaining knowledge from voluminous books and lectures, children must be made to interact in groups and express their views on various topics. Rather than taking notes from the teacher and textbooks, children must be made to research information on their own from library books and the Internet and share them in the class. This will help them to develop good reading habits, self-confidence and openness to criticism. It will also help them in developing critical reading and analytical skills.

The teachers should be more innovative and creative to students so that they will be able to access the material, not only that but they should also encourage participating in class room activity and discussion and this will enable student to acquire much skills.

4. A huge number of 90.84% students, as shown in Figure 4, feel that there should be a sense of freedom in students to choose their field of interest and does not go with what marks and degree one has.

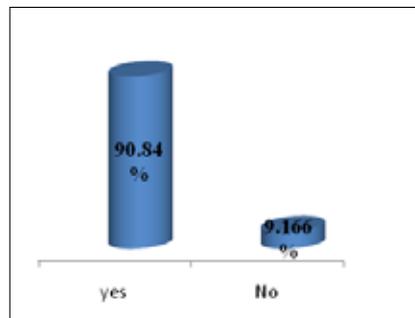


Figure 4 Freedom to choose their field of interest

It is suggested that one should recognize the student on the basis of her/his skills and talents and not by just looking at their report card having good marks. But unfortunately the first question asked to a Xth class or a XIIth class student is his/her percentage and not the area of interest. This attitude has to be changed and children must be allowed to choose subjects according to their interests.

5. Our schools are full of numerous pages of outdated theories and there is a lack of practical knowledge, and this fact is also supported by 70% students as shown in Figure 5.

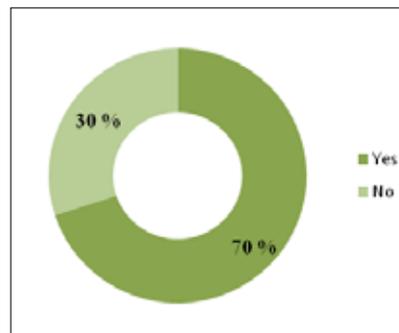


Figure 5 Pages of outdated theories and lack of practical knowledge

The authors think that it is the practical knowledge which holds greater importance than theoretical knowledge. There is no use of squeezing a huge book and drinking it. Whatever students may study, if they can't apply it to real life situations, it is of no use. Even though they learn less, they should know how to put that in practice. In most cases, failure is due to lack of practical knowledge, and students can gain practical knowledge only if we have practical oriented education. So we have to reduce the theory subjects and increase the practical subjects according to student's area of interest.

Conclusion

There is a critically important need to boost innovation because by the standards of developed countries India is no more than medium ranked on overall measures of innovative capability. In most Indian schools, emphasis is more on exam oriented learning.

We have to reorient our course curriculum towards practical knowledge and art of doing things.

This paper presents the methodology of encouraging creativity and innovation in Indian education system. Significant percentage of students has shown their keen interest in increasing more practical knowledge than memorizing the well known facts.

Authors feel that another way for enhancing better understanding and retention, teaching and learning should be

through multimedia projects of any subject and this will play instrumental role in imparting more enriched information flow. This is because multimedia (through its media elements namely text, graphics, still image, audio, video and animation) helps in better understanding of the concepts and better retention.

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