

ISBN : 978 - 93 - 84737 - 00 - 9

Vol. 1 No. 1, Nov. 2014

Journal of Indian Survey

Editor
Dr. P. Ramachandran

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ROLE AND EFFECTIVE USAGE OF TECHNOLOGICAL ADVANCEMENT IN TEACHING AND LEARNING

V. Pradeepa*

Introduction

The rapid changes and increased complexity of today's world present new challenges and put new demands on our education system. There has been generally a growing awareness of the necessity to change and improve the preparation of students for productive functioning in the continually changing and highly demanding environment. In confronting this challenge it is necessary to consider the complexity of the education system itself and the multitude of problems that must be addressed. Clearly, no simple, single uniform approach can be applied with the expectation that significant improvements of the system will occur.

Educational Goals

The approaches to teaching can be categorized according to major educational goals that affect teaching strategies. On one hand the goal of education is viewed

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as the transmission of knowledge by the teachers to the students. On the other hand the goal of education is viewed as facilitating students' autonomous learning and self expression. The former approach which converges towards the teaching of specified subject matter, may be termed 'convergent' teaching and the latter approach which stresses open ended self-directed learning may be termed 'divergent' teaching. The convergent approach is highly structured and teacher-centered; the students are passive recipients of knowledge transmitted to them and learning achievements are measured by standardized tests. The divergent approach is flexible, student-centered, where the students are active participants in the learning process and learning achievements are assessed by a variety of evaluation tools such as self-evaluation in parallel to teacher evaluation; documentation portfolios; and special projects.¹

Convergent Teaching

In general, adaptation to individual differences under convergent teaching tends to be limited. The students are all expected to strive towards one goal of learning specified required knowledge; some may attain it and others may fall by the wayside or be given some remediation with limited results. Nevertheless, there are various possibilities of effective adaptation to individual differences under convergent teaching. In addition to adaptation in the rate of learning, where each student can be allowed to work at his/her own pace, there are

many possibilities of adaptation through the use of diverse methods of teaching. Even when all the students are taught the same material, teachers can use different methods, different techniques or different media, to cater to individual differences in abilities and personal characteristics. Such a 'multi-convergent' approach can be more effective in giving the students opportunities to use their aptitudes and inclinations for learning and attaining higher achievements. As the students experience success and consequently a sense of competence, their motivation is enhanced to pursue further learning. Such an approach has a better potential for success than the common reality of students with learning difficulties, who often struggle through remediation with a sense of inadequacy and discouraging experiences of failure.²

Divergent Teaching

Adaptation to individual differences under divergent teaching may be expected to be productive because of its emphasis on autonomous, active, self-reliant learning. Yet, there are students who may not function well under divergent conditions because of their strong need for guidance, direction, and structure. Divergent teaching can cater to such needs by individual guidance, along with ongoing assessment and subsequent modifications. It is a 'guided-divergent' approach which is more structured and less flexible than the open divergent teaching but less narrow and limiting than convergent teaching.³

Teaching Strategies and Students Characteristics

Among the most difficult problems in an education system are those associated with effectiveness. The current preparation of teachers at specific age levels, specific subject matter, academic skills, etc., does not take into account sufficiently the complexity of factors such as various characteristics. There is a strong need for teachers to adapt instruction to the diverse abilities, learning styles, personality traits by using more differentiated teaching strategies.

In addition to the preparation of teachers, differentiated teaching, there could be more use of teaching resources. Worthwhile teaching can be done with advantageous results by persons other than the traditional class-room teachers. For example, valuable teaching can be done by peers of different

abilities. Also, parents, grand-parents, and other community members could participate in and contribute productively to the teaching process. Furthermore, teaching can be enhanced by volunteers, retirees, people with various areas of expertise from the worlds of science, business, engineering, medicine, public service, entertainment, and others. Also, high-tech resources such as multimedia technology, computer programs, telecommunication, the Internet, audio-visual techniques, and others can provide beneficial opportunities. Student learning can be greatly enriched further through travelling - near and far; interaction with peers

different cultures, different geographical areas, different occupations, different ways of life and different outlooks. Undoubtedly, many possibilities exist that are not often implemented even though they could make the teaching and learning process more effective and more beneficial by providing a variety of experiences and alternative strategies for adaptation to students' characteristics

1. Ability levels and patterns of different abilities
2. Learning styles.
3. Personality Characteristics. ⁴

Inter-Disciplinary Curriculum

One of the most exciting developments in the world of science today is the growing involvement of researchers in interdisciplinary collaborations, and the increase in cross-fertilization of ideas and research endeavors of people in different fields of science. The benefits for cross-disciplinary scientific work are invaluable and the various application possibilities are promising not only for science, but for many aspects of daily living.

These developments have direct implications for the education system. The tendency in our schools to teach bits and pieces of information related to particular disciplines. In view of the cross-disciplinary trends, the curriculum can be integrated around topics that reflect the patterns, interactions, and

interdependencies of the different fields. This can provide students with ways to study and attempt to comprehend the world around them through concepts and ideas that are less disparate or disconnected.⁵

The growing inter-disciplinary collaborations and co-operative sharing of information from different fields and the efforts to find pragmatic solutions to global problems have further implications for education. There are important implications for the preparation of students to function and be productive in a world with diverse populations, different economic conditions, multitudes of cultural, religious and ethnic groups, and many other different factors. Furthermore, it is highly beneficial to begin early in the educational process to organize learning around problem solving, critical thinking, and dealing with issues arising from different fields of study and different aspects of real life conditions.

The structure and organization of the student body can be in the form of small and large groups; study pairs; and individualized study arrangements. Social alternatives are possible in heterogeneous groups with a great deal of interchange within them and between them and other groups. Clearly, student groups may vary in age, cultural and socio-economic background, special interests and special needs.

There are various alternatives in the types of learning that an integrated curriculum can include:

1. Required subjects and basic academic skills some of which are taught in a convergent way, using in addition to teachers' didactic presentation programmed instruction, multi-media technologies, computer programs, videos, and other techniques involving technological innovations.
2. A number of required subjects and academic skills can be taught in a multi-convergent way where methods of teaching are adapted to students' different abilities, needs and interests. For example, different intelligences may be emphasized such as, linguistic intelligence, logical-mathematical intelligence, spatial intelligence, musical intelligence, bodily-kinesthetic intelligence, and others.⁶
3. A major part of the program can be devoted to an integrated inter-disciplinary curriculum chosen by teachers and students together. The units enable students to acquire knowledge and skills associated with different disciplines through congruous meaningful learning revolving around a topic of interest to the students. Work on the units is undertaken by groups of students who are encouraged to take active part in the decision-making process and focus

aspects of the units in which they can best develop their capabilities, satisfy their interests and fulfil their needs.

4. Individually chosen projects where the students can work on topics they have chosen and where they could apply their strong skills and competencies, wherever they lie. Students can be encouraged to present their work on their project to the group in any way compatible with their tendencies. The students can present their work to their peers and teachers as an exhibit, as an oral presentation, as written material, as a play, a video, or any other means of communicating and disseminating information. Divergent teaching is the approach used for those individually selected, and often independently pursued, projects.⁷

Conclusion

The above discussion of ways to implement various changes in the approach to teaching and learning grew out of the recognition that the current attempts at reforming the education system tend to be ineffectual. The attempts to use simple large forces (such as standardized testing, for example) in dealing with the ills of the complex education system are essentially doomed to fail. Undoubtedly, there are no simple general solutions to those multifarious complex problems. The above suggestions of some different possibilities of

implementing changes stem from the conviction that such special, differentiated approaches can be beneficial and can have significant positive effects on the teaching and learning process in our educational system.

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