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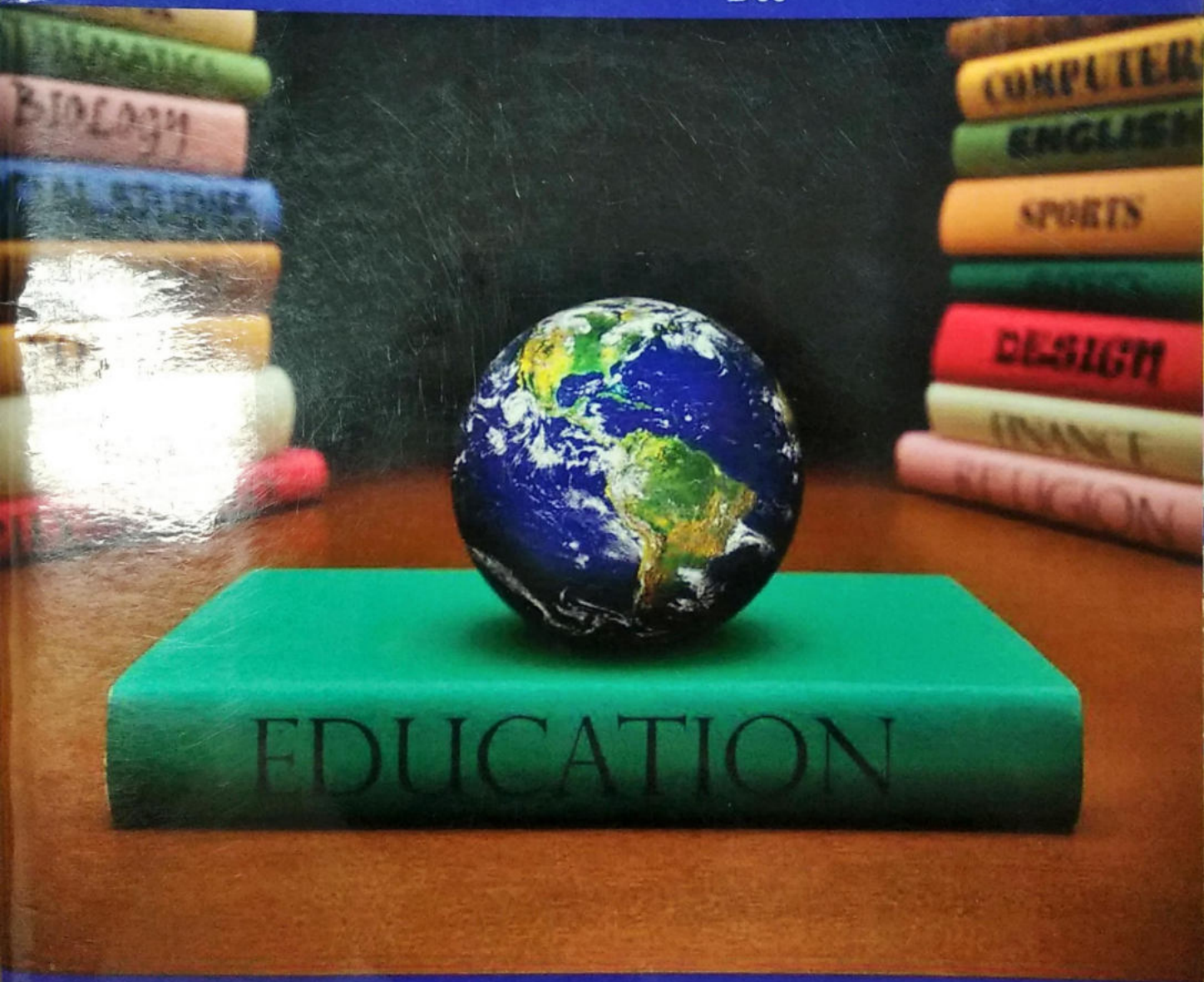

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Evidence based reasoning strategy: for augmenting Indian higher education pedagogy

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Abstract
The teaching learning strategies of higher education system of the country need to be renewed according to the global and local expectations since it can determine the future of our nation. Instructional strategies of higher education should be re-designed to draw full potentials of the students and enable them to think in a critical and creative way. Evidence based reasoning strategy is an innovative instructional strategy which can be used to foster higher order reasoning ability and internalization of concepts. Through this paper the investigator attempts to analyse the existing scenario of higher education in India with specific emphasis to pedagogy and tries to explore the possibilities of evidential reasoning strategy in the betterment of teaching learning process.

Keywords: evidence based reasoning strategy, higher education

Introduction

The aim of education must be to awake and promote the innate ability of individuals and to train them for development of self and democratic values. Therefore, education should be given highest priority in any scheme of national development. The higher education system in India is the world's third largest in terms of students, which is next to China and United States. There has been a considerable improvement in the higher education scenario in India, both quantitatively and qualitatively (Arunachalam, 2010) [1] but when compared to the global standards the situation is not satisfactory. At present the higher education sector is more or less teacher centred and content oriented. Student's higher order thinking and reasoning skills are not fostered appropriately by the class room activities.

Many programmes have been implemented for uplifting the quality of primary education and they succeeded to an extent. The higher education system of the country need to be renewed since it can determine the future of our nation. Yashpal committee (2006) reported that 'We have tended to imprison the disciplinary studies in opaque walls. This has restricted flights of imagination and limited our creativity. This character of our education has restrained and restricted our young right from the school age and continues that way into college and university stages. Most instrumentalities of our education harm the potential of human mind from constructing and creating new knowledge. Indian higher education can be characterized by a sea of mediocrity, in which some islands of excellence can be found (Altbach, 2014). The pedagogical strategies and instructional methods adopted in higher education system in not well defined when compared to the primary and secondary education.

At least half-dozen high-level commissions have issued intelligent reports over the past 40 years; starting perhaps with the University Education Commission (Radhakrishnan Report) in 1948.All these reports have recommended many ideas for thoughtful reform, development, and improvement. Over time, elements of some of these reports have been partly implemented, but in no case at all have any been comprehensively applied.

The overall scenario of higher education in India does not match with the global quality standards. Hence, there is enough justification for an increased assessment of the quality of the country's educational institutions. The American Association for the Advancement of Sciences (AAAS-1990) observed that, 'What the future holds in stores for the individual human beings, the nation, and the world depends largely on the wisdom with which human use science and technology. But that in turn depends on the character distribution and effectiveness of education that people receive'.

The quality of higher education should be increased to explore the full potential of the students. For this purpose new instructional strategies and methods should be adopted by the educational system from time to time based on educational research advancements in this area to make the educational process more fruitful. Evidence based reasoning is a relatively new instructional strategy which can be used in our higher educational system for increasing the advanced reasoning of students. Many educators applied this method in the classroom instructions and found to be more effective than the conventional teaching learning process.

Evidence Based Reasoning – An effective alternative

Evidence based reasoning strategy (EBR) is an innovative instructional method which used to foster the higher order reasoning ability and internalization of concepts. The basis of good decision, argument, or opinion is logical reasoning that is supported by evidence. Reasoning using evidence is the heart of scientific literacy and, arguably, science itself. Reasoning using evidence is extremely important to student success, in and out of the classroom. Students are expected by our society to grow into citizens that vote on important decisions revolving around large multifaceted issues (Erol Chandler, 2013) [3].

Evidence consists of statements describing observed

relationships. Because the evidence is grounded in a specific context, the process of interpreting the evidence to produce the rules is first and foremost a process of generalization. To make use of gathered evidence, it must be transformed into a statement with enough generality that it can be applied in a new situation. In more sophisticated examples of reasoning, interpretation requires weighing more than one piece of evidence including some that might serve as counterevidence. In calling this process interpretation, no presumption of method is made; depending on the circumstance of reasoning, it may be qualitative or quantitative, rigorous or implicit (Nathaniel *et al.* 2010) [8].

For analyzing evidence based reasoning in class room, Furtak *et al.* (2010) [5] developed a framework, using which they create a coding system for the assessment of argumentation in class room discourse. It was aimed to provide a means for measuring the quality of EBR in whole classroom discussions. This new frame work combines previous frameworks that focussed structure of arguments and epistemic quality with a framework for assessing students' ability to construct evidence supported arguments in science classroom discourse. To assess the acceptability of EBR among teachers in higher education sector, Bell *et al* (2003) [2] analyzed written responses and recorded interviews of university professors from a range of disciplines to better understand their use of EBR. Dong and Ling Xu (2011) [4] surveyed on how evidential reasoning approach used for analyzing multiple criteria decision problems under various types of uncertainty using a unified framework-belief structure. Evidence based reasoning can be utilized in many facets; Sharia and Azadi (2013) [11] applied evidential reasoning approach as a method for knowledge management (KM) strategy selection. The process of building a multiple criteria decision model of a hierarchical structure is presented, in which both quantitative and qualitative information is represented in a unified manner. EBR approach is found to be effective in awakening the full potential of students in the knowledge exploration.

Evidence Based Reasoning Strategy-Conceptual genesis

EBR is deeply embedded in scientific argumentation and sceptical review, as is it at the heart of well-supported opinions and decisions. A number of different frameworks have been used to track the development of students' abilities to reason and argue in classroom discussions (Sampson & Clark, 2008) [9]. Some of these frameworks are based on completeness of arguments as compared to Toulmin's (1958/2003) [12]. However, many of these frameworks do not track teachers' contributions, and do not take place in regular classroom contexts.

The Evidential Reasoning approach is developed on the basis of Dempster-Shafer evidence theory (Shafer, 1976) and decision theory. By introducing the concepts of belief structure (Yang and Singh 1994) [15] and belief decision matrix (Xu and Yang, 2003) [13], for the first time it becomes possible to model uncertainties of various types of nature in a unified format for further analysis without resorting to sensitivity analysis.

In 1989, the concept of belief degrees was first introduced to MCDM for describing the performances of an alternative decision over qualitative attributes (Zhang *et al.*1989) [17]. The first version of the Evidential Reasoning approach was published (Yang and Sen 1994) [14], providing the first innovative link of its kind between MCDM and the theory of evidence. In 2001 a set of rule and utility based information transformation techniques are developed by Yang. The techniques play an essential role in enabling the ER approach to handle different types of information, including a mix of quantitative and qualitative information with uncertainties.

From time to time many researchers developed different frame works and strategies based on evidence based reasoning to implement it in the teaching learning process.

Evidence Based Reasoning Strategy-from Theory to Classroom.

If both teachers and students actively participated in the knowledge inculcation, using advanced teaching learning strategies the education process become more interesting and instead of rote memorisation students can learn meaningfully. Evidence based reasoning strategy is such a method used to arouse the reasoning. When EBR is used to teach a new concept, the teacher start with what student Sal ready know and understand and build new knowledge on that. Then, working outward from these prior knowledge students builds connections between old and new knowledge to allow a proximal location for new knowledge to be stored. Emulating real world EBR in the classroom is not easy to do. However, incorporating discussions of authentic issues is one strategy that has been suggested as a way to engage students in using evidence to support their positions (Michaels, 2008) [7]. Besides emulating real world experience, and being a "hook" for students, discussion based learning using social scientific issues has been shown to have great potential for increasing student learning.

Students were asked to first investigate the EBR that they each do on a daily basis. When they had come to understand the components of claim (evidence and reasoning of their own informal EBR), they started building up to more formal and scientific claims, reasoning, and evidence. Students were guided and supported in both brainstorming and discussion by their peers and the instructor throughout the lesson. Pre and post discussions were also used to help students develop their ability to use EBR, as well as being used to assess the amount of EBR done by students. Through argumentation, students were encouraged to build and support a claim, and back it up with evidence (Erol Chandler, 2013) [3].

The teacher focused on instructional objectives and goals during the student discussion. Students were also asked to consider whether they felt that they had achieved these goals as they left class, as a way for them to reflect on their experience and increase student learning, as outlined in the research. Kuhn and Franklin (2006) [6] noted three requirements that need to be fulfilled for children to coordinate theory and evidence. Children need to realize that, a theoretical claim can be falsified, evidence can be used as a means of falsification, and evidence and claim are different epistemological categories. Thus, for students to use appropriate arguments in science discourse, they must realize that the construction, testing, and revision of theories and hypotheses about scientific phenomena constitute a fundamental part of the scientific endeavour.

In evidence based reasoning strategy students and teachers actively participated in the learning process. Teachers help students to analyse the content systematically and compare

the new concept with already known evidence. Through systematic analysis the new claim is also proved to be right with the help of evidences. Counter evidences are also provided to check whether the students understand the concept.

Constrains in the application of EBR

Though EBR is a novel instructional strategy which can boost the reasoning skill and critical thinking of students, there are some challenges in the implementation in class room scenario. In India the higher education sector is more or less teacher centred, a change in instructional strategy may not be easily acceptable among the teachers. Planning the EBR strategy for each learning material and preparation of teachers need more time and dedication when compared to the conventional methods of instructions. The teacher has to align the new concepts in the frame work of EBR and to find appropriate evidences and counter evidences. This process also needs time and effort.

Conclusion

Instructional strategies have a great role in the quality assurance of higher education. Incorporation of innovative instructional strategies in the higher education sector would improve the effectiveness of teaching learning process to an extent. Evidence based reasoning strategy is such an instructional strategy that educators can apply to the higher education field. Through this strategy the reasoning skill of students improved and teachers can draw out the full cognitive potential of the students. The heuristic nature of learning can be sustained forever.

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