

## **Personalized and Adaptive Learning (PAL): The new hope for Indian education**

There are often paradigm shifts that occur in the course of evolution that completely alter the way certain activities were being done. These are sometimes in response to sudden challenges or to the occurrence of disruptive events in the form of large impact natural events.

But we are witnessing some shifts currently that are occurring because of the rapid convergences between technologies and their disruptive effects on the present way of doing things. This is also promoting the shift towards an emerging Knowledge Economy, where the most important resource is the human resource and especially its innovation and creative ability to create cognitive capital.

Our traditional model of educational excellence requires the establishment of an educational campus, maybe as a school or a college or a University, wherein highly accomplished faculty and highly capable students are provided an array of learning facilities and an encouraging learning environment.

The model has stood the test of time, and several Institutions across the world have established themselves as highly respected schools, colleges or Universities. They are however for the chosen few and an additional problem is that there are no measurable performance parameters to see how they measure up in comparison amongst themselves or against themselves in different years. In the absence of 'learning metrics' which can measure the different components of a good teaching-learning experience, a well planned and measurement oriented approach towards achieving well defined goals, attaining the benchmarks of prevailing best practices or progressing towards the next practices as exhorted by C.K.Prahlad becomes a difficult task.

Let us begin with the current state of educational measurements. Most systems in India look at the performance of students at the 10<sup>th</sup> and 10+2 level Board conducted public examinations, as a summary of a student's 12 years of education. This is often indicated in terms of marks or grades or percentiles, all of which are normative measures and do not provide any comparison between different examination Boards (and we have a large number of them), or between different years of even the same examination Board. Hence the need and existence of numerous additional screening examinations for entrance to higher education which themselves are not standardized or subjected to a rigorous analysis for their effectiveness.

There are some parameters prescribed by the regulating agencies such as the School Boards and the UGC/AICTE but they are all at the level of Infrastructure and some other aspects of input. But there is no articulation of learning outcomes as criterion referenced evaluation or of the processes themselves and especially on the customization of the teacher-learner interaction. Also the system encourages a very exclusive system of education, with very few seats; numerous restrictions and almost 100 times more people denied the opportunity.

So what are the current challenges before us? In one sentence it is to deliver high quality education, to a large number of students in a manner that all of them can acquire the knowledge and skills agreed as the desired learning outcomes. And the distribution of their achievement indicators (grades) is no longer the standard Bell shaped

curve of a normal distribution, but a flatter distribution with almost all learners getting the full score.

Two recent Constitutional amendments that have made this a requirement are the ones relating to the Sarva Shiksha at the School level and the reservation for the OBC. A lot of people have expressed opposition to the reservation move based on the misconception that good education can only be provided to a 'few' and not to 'all', implying the so-called lack of 'merit' makes them unfit for education. This is not quite true, and is a result of lack of awareness of the power of newer models of education on which educationists worldwide have been working upon for a long time, and modern technological solutions implementing such models.

Researchers such as Skinner, Lev, Dewey, Piaget, Brunner, Spiro, Merrill, Bloom, Marzano, Gardner, and Keller have developed many theories and models for pedagogy.

Similarly psychologists have been studying different personality types and developing on the initial work of Carl C Jung, the most famous being the MBTI classifying personalities on Extraversion-Intraversion, Sensing-Intuition, Thinking-Feeling, Judging-Perceiving, developed by Isabela Briggs Myers and her mother Katherine Cook Briggs.

While we do realize that every learner is unique, but in our delivery of education, we force just one model for all, and therefore the result is that only a few are able to successfully complete their learning goals. Rather than declaring the student a failure, we must acknowledge the inability of the teaching process to match the learning style of the learner.

Pedagogists categorise themselves as behaviourist, cognitive and constructivist, though there are more than maybe 300 different pedagogical strategies that have been proposed in the literature.

A traditional class-room situation does not allow for the implementation of multiple learning styles, although the same teacher may adopt a variety of different teaching-learning strategies during a session. However it is the same sequence of presentation that would be available to all the students.

But using modern computer based technologies it is possible to allow for multiple learning styles to create a higher degree of personalization and implement adaptive learning to enable every learner to reach the desired goal, and maybe eventually reach a 6 sigma level of performance.

Dr. Nishikant Sonwalkar, as Principal Educational Architect at the Massachusetts Institute of Technology, has synthesized some of the most influential theories into a multi-dimensional framework that allows a systematic approach towards excellence in the design and development of effective online education that is adaptive and uses the learning preference diagnostic tests to present educational content to match the individual learning styles.

The five fundamental learning styles proposed by Dr Sonwalkar are:

**Apprenticeship:**

A "building block" approach for presenting concepts in a step-by-step procedural learning style.

**Incidental:**

Based on “events” that trigger the learning experience, learners begin with an event that introduces a concept and provokes questions.

**Inductive:**

Learners are first introduced to a concept or a target principle using specific examples that pertain to a broader topic area

**Deductive:**

Based on stimulating the learner to enable the discernment of trends through the presentation of data, simulation, graphs, charts or other data.

**Discovery:**

An enquiry method of learning in which students learn by doing, testing the boundaries of their own knowledge.

Adaptive Learning Systems may be defined as intelligent systems that are self-organized based on the observation of the learning preference of an individual resulting in their best learning performance.

The system needs to have a well defined pedagogical framework, a well defined quantification of learning performance and learning preference inference model and a dynamic content sequencing engine to present the learning resources.

Developing on these, a product has been developed, named iDesigner that will allow academics to transform their course content into an adaptive learning mode and this has been successfully demonstrated for a range of courses from mathematics at school level, a digital literacy course, and English as a second language course, a management course and several other programs.

This general approach can be applied in a number of contexts.

First let us see the possibilities of using them for technical education such as in the IIT’s and other technical Institutions. After the reservation decision has been implemented, the student demographic at these Institutions will not be a narrow homogeneous group but a largely dispersed one with varying scores in the JEE, reflecting the variety of learning styles embedded in the range of JEE scores. The above model of adaptive learning which has already been tried out at MIT and some other Institutions provides an appropriate answer to both expanding the intake, teach a heterogeneous group and get better outcomes. The Institutes are already well equipped and deploy learning resources that can be readily converted to the new format.

There is no difficulty in doing the same for the general degree programs. In fact Dr.Sonwalkar conducted recently a 5 day workshop for a group of about 25 University faculty at the Consortium for Educational Communication at New Delhi in the methodology. If we scale this up quickly to involve a few thousand teachers from a few hundred Universities the desired Constitutional objectives can be achieved. Similarly if the the NCERT and the National Institute of Open Schooling too adopt this methodology then in a decade or so, there may be no need for reservations of any kind.

Lack of funds is not the real impediment to adopting this approach. But a positive outlook and a desire to be able to deploy a new strategy to solve the new challenges is required.

It is a pity that the Knowledge Commission which could have given a lead in creating a socially inclusive system providing a high quality education to all, instead of exploring methods to achieve the goal is still trying to maintain an elitist exclusive club for those who have access to this limited good quality education.

How will the adaptive learning model work in the future? In the not too distant future it would seem very difficult to have intermediaries who would be able to re-package existing knowledge ( as is currently done in text-books) or increasingly as new media products for easy assimilation by the students. As John Ziman had said “ A treatise expounds, but a textbook explains”.

But if we go by the scenario analysis by Nick Bontis, a Knowledge Management Guru ‘ By the 1930’s, the world’s cumulative information base was doubling every 30 years. By the 1970’s, this rate shrank to 7 years. By the year 2010, the information base of the world, will double every 11 hours’. It would clearly not be possible to have enough text-book writers and text-books for them to be current and useful.

The learners of tomorrow will have to be better information gatherers and users and the role of teachers would be more of mentors and annotators of learning resources so that learners can transact them with the learning strategies that are suitable for them. The learning community of tomorrow using participative media and technologies such as handheld devices, communicating through podcasts and blogs seeking knowledge directly from the Internet through wikipedias, creating there own folksonomies would be very different from the schools and University Communities of yesterday.

Just imagine what it could do for the long tail which had been kept deprived for so long.