Integrated and Inclusive Learning

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Introduction

Traditional education programs in India are syllabus-bound and examination driven. Examinations are necessary, but the drive towards standardisation of the examination system has led to predictable questions with unambiguous answers. When the quality of education is measured primarily by marks or grades, it could lead students, teaching staff and education administrators to single-mindedly focus on good grades. This is likely to result in students acquiring enough nuggets of information on the subject, but not necessarily with much wisdom or fundamental understanding, since concentrating on metrics alone risks missing critical insights.

The challenges

When such risks engage the mind, impact-oriented educators design courses focused on creating inspiration, curiosity, and a lifelong desire to learn. A preferred route is to offer hands-on learning, ensuring students learn through the process, irrespective of the grade. In teaching computer programming, for example, one needs to focus not just on the number of original programmes written, but also on the complexity, on the problems encountered, and how defects were corrected by students after feedback. Since elegant programming is an art, there is much value in learning in groups or finding a buddy whose code students can critique. Students can thus learn there are different ways to reach the goal, and even different ways to code the same solution. They learn also from mistakes made by others, and how to avoid them. Another problem in teaching programming is that students come with varying degrees of skill, thinking ability, and even motivation. Teachers strive to do justice to the entire spectrum. Students of computer programming and a software engineering practitioner often learn best through making mistakes. Arguably, writing code that works right first time is evidence of genius but may not offer a predictable and reusable learning process. When the code does not work as desired, students struggle to find the errors, and hence some much-cherished ‘Aha’ moments emerge, thus building the foundations for confident programming. Our challenge as teachers is to create such an environment, aiming to ensure students struggle, fail, think, and learn.

Creating achievable challenges, nurturing initiative, and peer learning
The approach we tried was as follows:

1. The course curriculum requires 50 programmes, of varying complexity to be written, which is announced in the beginning of the semester. Students write programs and collect points based on complexity of programs they have written.
2. A 10-point scale is created to assess and objectively find students' levels at the start of the course.
3. Based on this, they are assigned customised challenge levels.
4. The students at the highest levels are designated captains, and other students choose their captains. Thus teams are formed. Teams are given their targets and incentives.

This can lead to interesting results, with the most motivated students cutting across groups and sharing experiences, while the least motivated are not sufficiently confident to interact. Most students, however, do learn questioning, taking initiative, and discovering the thrill of writing code that works.

Creating an inspiring ambience
Another course element involves creating an off-site learning excursion centred around multiple technical challenges, to be solved over a 3-4 week period in a 'stretch' routine, starting at 8am every morning and going on till midnight. Since doing technical work all day can be boring, the programme is filled with variety of other useful activities, including mini-excursions with industry leaders who focus on a chosen theme, psychometric instruments for self-assessment, outbound learning, debates, selected movies, and competitions that widen their exposure. The presence of academics right through the technical grind and the structured fun takes the students through a holistic experience, aiming to create a lifelong love for programming challenges which subsumes the lesser objective of teaching programming skills. When the student is infected by the joy of doing something, she will discover the rest on her own, and the teacher's presence will only accelerate the discovery. A single teacher provides continuity throughout the program, from design to evaluation and this is critical to success.

The off-site holistic activities engaging industry leaders, with diverse exercises, games and competitions together create an inspiring and memorable experience, offering a warm ambience where that programming habit is born. However, many question why all this is necessary, and parents of daughters (in the Indian context) with all good intentions may not allow their children to be part of this. Education thus needs to involve the parents as critical stakeholders.

Assessing this intense engagement is complex; students may copy, so we have to create problems that are new every time. And students will make mistakes or fail in different ways, so the teacher has to monitor every error and show students the path from ***that*** error forward, careful not to simply reveal the right answer. This customized effort is necessary – depending on standard questions and uniform approach has proved ineffective.

Similar methods, another context

Centurion University also aims to create employability for young people from under-privileged sections of society offering not just training for skills but on cultural aspects of living an unknown society; these students study free, alongside students from privileged backgrounds pursuing sought-after professions. We take a holistic view of education, exploring, for example, big-city living, coping with long commutes, working in corporate environments with potentially impatient and sometimes insensitive managers, dealing with unfamiliar food issues and even getting acquainted with urban toilets. These lessons in inclusion are critical enablers to their success as professionals and in building responsible citizenship.

Our rationale for change

We are today in a knowledge era, with free access to information, deluged by choices that can cause disconnect between learning systems and expectations from the real world. The challenges of education have moved beyond knowledge transfer, as we witness an exponential increase in content. Our approach offers an integrated and inclusive education involving critical stakeholders like parents and peers. Ethics, curiosity and motivation are critical to our foundation. If the purpose of education is to build the next generation of nation builders, to bring in equitable opportunities to all sections of society, or to create responsible, happy citizens in a sustainable environment, we need to change, aligning ourselves to the needs of 2020 rather than looking back to structures that worked well in 1920.

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