

Education as a path to progress

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Education has been the accepted means of progress in modern times. However, in a country where graduates struggle with unemployment, or are forced to work in low-paying cabbie and delivery boy jobs with no path to growth, this is clearly not the case.

In 15th-century Europe, only about 15% of the population was literate, primarily among the elite class. However, several transformative events during this time led to the Renaissance—a great revolution that ushered in a flourishing era of scientific, intellectual, and artistic growth. A key invention of this period was the printing press, which enabled mass production of books. This significantly increased literacy, allowing more people to engage with new ideas. In a sense, some power shifted into the hands of the people. For instance, at the time the Bible was available only in Latin, making ordinary people dependent on clergy for religious interpretation. However, during the Renaissance, books became available in local languages, enabling people to read, understand, and take up newer religious ideas independently.

The core principles of the early Renaissance were rationality, reasoning, and faith in human intellect. Today India urgently needs a transformation that can convert that same human potential into a modern, high-value productive capacity.

The productive capacity of its people is a vital determinant of a country's economy and standard of living. A society with capable and creative professionals—doctors, engineers, economists, planners, entrepreneurs—can provide better infrastructure, a cleaner environment, and high-quality everyday goods. Construction, electricity distribution, and sewage management and other sectors will be modernized, and workers will find secure, respected, and productive employment. Moreover, higher productivity among people will naturally reduce unemployment.

The question is: How can this positive cycle be established?

Poor educational outcomes

In the modern world, the responsibility for human capacity development has been accorded to educational institutions. But currently, there are some serious issues in these institutions. Pratham, one of the foremost organizations in the education sector, publishes an annual report (ASER Report) on school education based on extensive testing across the country. Recent surveys have shown that 51% of 5th-grade students couldn't read a 2nd-grade textbook, and 44% couldn't perform subtraction with two-digit numbers. There has been minimal improvement over the years.

Similar issues persist in higher education. While the data is less systematic, some indicators are available. According to a 2023 report by the International Labour Organization (ILO),

unemployment among graduates under the age of 24 in India is as high as 50%. A recruitment firm Mercer-Mettl, which connects job seekers with employers, analyzed data from over ten lakh students and found that 57% of graduates were unfit for employment.

In summary, the situation is alarming, and the government has been implementing new policies and reforms to address this. In the recent past, the National Education Policy (NEP) 2020 outlined inclusive goals, emphasizing the need for curriculums that enhance intellectual and creative capacities. For higher education, it emphasized holistic learning, vocational training (e.g., ITIs), technology integration, and institutional reforms. But few concrete measures or concepts are given.

A few specific solutions like the use of local languages, adequate teacher numbers, and reduction in teacher transfers were mentioned, but there is no detailed assessment of their effectiveness. For instance, in most rural areas of Maharashtra, the students are Marathi speaking, and education is in Marathi—making the language issue less critical. There's no analysis of the lack of sufficient teachers, its extent, and how addressing it might affect learning outcomes.

The NEP primarily discusses broad and inclusive objectives, but what's urgently needed is a practical approach that identifies the fundamental flaws in the current education system. This article proposes such an approach.

What is needed

At its most basic, education generally has two primary objectives. One is minimum competencies at a certain academic level—such as reading, writing, arithmetic, and basic awareness about one's environment (for e.g., local farming practices in a village). The second is cognitive development—the ability to analyze, evaluate, and create - which enables learners to adapt to changing circumstances. A few key principles are essential in an education system that can do this.

Curriculum and teaching must reflect local context and student capability. To be effective, the curriculum must connect to students' lived experience. For example, urban and rural students have vastly different experiences. A flexible curriculum is needed to address such local diversity.

An example of a topic for such a curriculum could be the traditional cook stoves (chulhas) commonly used in villages. This everyday household tool can be used to teach science, engineering, environmental concepts, and more. Estimating the calorific value of fuels such as firewood, cow dung, or straw, would help students understand energy density and efficiency. Observations and measurements can be easily done at home, and students get introduced to the scientific process thus promoting cognitive development. Also, they gain a scientific understanding of a commonly used object and local fuels.

Reform in the B.Ed. Curriculum

Teacher training must support such contextual and flexible curriculum, as teachers are the most critical element in this system. Research institutions and academic institutions in the education sector, the Homi Bhabha Centre for Science Education being a prominent one, must actively participate in updating school and B.Ed curricula. A cycle needs to be established among educational research institutes, B.Ed. colleges, and government schools, enabling continuous experimentation, testing, and gradual scaling.

What About College-Level Education?

A similar concept is applicable at the college level. Curriculums are often overly theoretical, difficult, and impractical. As a result, students are unable to absorb the content, and hence nor does it allow for cognitive development. The solution lies in education that is relevant to local contexts. The cook stoves example may be used here too.

Engineering students could be taught about combustion and heat transfer using chulhas—bringing key mechanical engineering concepts to life. In fact students may even be motivated to improve stove designs. Applying academic resources to solve local problems or analyze real-life situations is widely accepted as an excellent teaching method, offering multiple benefits. Experiential learning fosters subject interest and helps students understand how scientific principles work in practice.

Moreover, teaching with real-world references naturally promotes interdisciplinary learning. For instance, electrical engineering students learning to design or select an appropriate solar-powered irrigation pump must understand how water levels change seasonally, whether farmers use drip or sprinkler irrigation, etc.—all of which influence water flow and pressure. Hence, calculating how many hours a 3 HP pump would operate on a winter day requires students to understand basic fluid mechanics.

This approach not only builds specific subject knowledge, but also equips students with methods and skills to tackle new topics, ensuring problem-solving capacity in the face of changing professional challenges. Such a curriculum development needs the active involvement of top institutions like the IITs and IGIDR. These institutes, and only they, have the funds, skills, and research capabilities required.

Examples of Current Initiatives

Some of these strategies are being implemented in some initiatives. A few examples of initiatives by Unnat Maharashtra Abhiyan (UMA), a joint project of the Higher and Technical Education Department and IIT Bombay are given here.

UMA trains college students and teachers to analyze or address problems in their surroundings through their academic disciplines. For example, electrical or civil engineering students might work on the local power supply or irrigation system. This includes credit courses, internships, workshops, and textbooks—with field visits, observations, and surveys as components. Most

colleges in Maharashtra can easily implement such projects.

Another example of UMA, “Aple Prashna, Aple Vidnyan” (APAV) or “Our Questions, Our Science”, is a two credit course available to undergraduate students at major state universities. APAV encourages the study of small topics like tuber farming, scrap trade, or the campus shop. Students learn to collect data, analyze it, and write reports. Training is given to students as well as faculty through workshops, YouTube videos, and other material.

One example of school intervention is being conducted in Zilla Parishad school in Ratnagiri. Students are being taught math, geography, and science using satellite maps of their village. They write their names, addresses, and travel time to school on the board—developing a shared understanding of their locality. They draw maps of their daily route from home to school. Besides lessons in math and geography, through the satellite maps of their own village, they directly experience the application of technology and in their lives, prompting questions such as how the maps were made.

Exercise involving observation of local and material reality, documentation, and analysis, not only improve math and science skills but also develop self-expression, emotional intelligence, and social skills. And alternatively, education being tied to real-world development issues, is a driver for developing solutions and for progress.

Connection to development

Traditionally, curriculum reform focuses on industrial needs and employability. However, India's public infrastructure has many weaknesses, as evident from frequent train accidents, bridge failures, and water shortages. Including the study of public systems in education can lead to the design of new tools, processes, and solutions, ultimately creating new jobs. In essence, a virtuous cycle can be established between education, public needs, and employment.

Over the past few decades, it has become clear that the trickle down effect has failed in India. Investments in infrastructure, industrial growth, and high-end research haven't significantly improved public outcomes. Historical evidence and experts say that a society cannot develop unless human capabilities are developed. The creative changes in the education system proposed in this article will certainly be effective as a step in that direction.

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