Position Paper of the Roundtable on

Role and Impact of AI Technology in School Education for Effective Implementation of NEP 2020

Organised on 13th March 2024

The Raj Reddy Center for Technology and Society (RCTS), a research translation center in IIIT Hyderabad with a focus towards creating technology solutions to societal issues, has been working towards developing solutions to fast-track the implementation of the national education policy (NEP) 2020. As part of this effort, over the past two odd years, we have been engaged with government schools, NGOs, and other organisation in this space, through roundtables, outreach, and field pilots. During this same period along with the wide release of large language model (LLM) and generative artificial intelligence (GenAI) based platforms (ChatGPT, Llama, etc), and their attractive outputs, have built up large interest for their potential use in a variety of domains including education.

We have organised a closed-door brainstorming roundtable meeting on "Role and Impact of AI Technology in School Education for Effective Implementation of NEP 2020", calling in key members in the education and technology space such as non-governmental organisations (NGOs), academicians, Edu-Tech Start-ups, and corporates, to explore broadly on this topic.

The discussions in the roundtable were divided into three focus areas:

a. *What are the technology tools you currently develop or use for any aspect of education?*
b. *In the past 6 months what have been the new "AI" Technology solutions that have cropped up in your sphere?*
c. *Future Innovation.*

The current report will summarise the views expressed by the various attending panel members.

A. Tech-tools Prominently in use Today for School Education

The first section of the roundtable conversations explored was their current technology development and usage. With the panel members covering various aspects of the education sector, such as educators, researchers, corporate developers, and governance agencies; broadly all aspects of education were touched upon during the discussion.

There is a diverse landscape of Digital Learning Content Platforms

The primary tools currently being developed or used are teaching content platforms. The breadth of content coverage on these platforms varied from broad K-12 educational content to applications with specific focus on STEM education, gamified learning, language literacy, life skills education, and coding concepts. There have also been efforts towards developing and piloting tools for smart classrooms, and AI based content generation and assessment with varying levels of success.

Remote Learning Beyond Screens helping in High Engagement and Wider Scale up

The tools mentioned above have seen various levels of public acceptance, with certain tools like the “cardboard-based coding kits” receiving great response from kids and teachers alike, with ~2.4 lakh student learners from grade 6 to 10 having used the product and receiving ~98% happiness quotient index for user rating collected through anonymous surveys. This was a block style tool, developed by Next Skills 360 EdTech Private Limited, for learning coding concepts which combines low-cost cardboard pieces for the code blocks for use by students and a computer vision-based application for teacher use, to execute the programs built using the code blocks.

Tech-led Tools helping Career Counselling & Guidance Shape Students’ Future

Other associated services such as the career counselling services “Vidya Helpline”, run by Nirmaan an NGO in the education space, has also been received positively with over 20,000 students benefiting as of 2023 in making sound educational and career choices. This highlights the importance of human support alongside technological tools in shaping students' futures.

Platforms with Multifaceted Benefits has Broader Market Appeal Catering to Diverse Needs

Education instruction platforms alongside content generation-based solutions have also seen positive response across multiple Indian states, for their curated education and administrative tool sets, personalised learning content generation, and assessment capabilities. The target for these tools has been both traditional K-12 schools and the broader education market such as exam coaching centres and remedial learning centres.

B. Challenges in adopting emerging tech solutions in government schools

Despite the promising potential of emerging technologies in education, government schools face unique challenges in adopting these solutions. Limited budgets often restrict access to

necessary hardware and reliable internet connectivity, hindering the implementation of online platforms or digital learning materials.

Furthermore, teacher training often lags behind the rapid pace of technological advancements, leaving educators unsure of how to effectively integrate these tools into their classrooms. Additionally, there are concerns around student data privacy and security. These combined challenges can create a significant barrier for government schools looking to leverage the benefits of emerging educational technologies. Some of barriers discussed in the roundtable are listed below:-

Lots of Manual Effort needed to make the tools Inclusive and NEP Compliance

Major efforts over the past few years, have still been manual in nature, such as the generation of learning resources for specific needs such as video resources for hearing impaired students (that include Indian language subtitles as well as sign language interpretations), and teaching materials, reports, and work plans to handle multilingual classrooms as per NEP guidance.

Indefinite Hindrances for Piloting solutions due to Changes in Govt Systems

The localised positivity among participants has been a repeated observation but there have been equally many cases of poor reception due to a mismatch in the estimation of what the field situation and needs are, such as the pilots halting due to change in overseeing officials, underutilization of introduced education technology tools due to lack of reliable network connectivity, lack of user training, or the introduction of certain learning tools with speech as the medium of interaction in classes where the students lacked the vocabulary and language skills needed to utilize them.

Lack of Infra, Low Tech Literacy, and Resistance to Change acting as Barriers for Adoption of Solutions

In addition to the above technical mismatches and lack of infrastructure and devices, there has been a much larger factor affecting the acceptance of technology solutions in many cases, which is the fear towards technology. The communities where the solutions are introduced in many cases have very low technical literacy, posing a great hurdle in the onboarding of new users. This lack in user knowledge is also compounded by the fear towards the capabilities of technology or the perceived threat to existing practices as well as fear of accountability for possible negative repercussions from the use of computers and other technology solutions.

Unreliable Data and Devoid of Local Context causing Low Efficacy in GenAI & Emerging Technologies

Contextualization has also been an issue with the GenAI based solution, as most of the models currently available have not been well tuned for an Indian context. This is compounded with issues in the reliability and usability of the content generated due to issues such as copyright infringement in content used to train these models, model hallucinations,

and language compatibility. The final hurdle has been at the governance level where the reliability of records has been inconsistent, preventing impact measurement for any introduced technology interventions.

C. The Recent past new Tech-solutions under Pilot with high scope of Scalability

We continued the conversation regarding technology solutions in the second section of the roundtable but focused on the past 6 months to get a better picture of the current scenario of technology in education. The discussions revolved around the attractiveness, usefulness, and field readiness of the solutions.

LLMs and GenAI Models CoPilots being Experimented in Govt Schools

Most solutions that have been talked about in this period that could have potential field usability, were either involving the use of LLM and GenAI models for educational content generation or for performing assessment.

Few commercial efforts pointed to as an example included Microsoft's Co-pilot functionality for personalised learning content generation as well as assessment of longform written reports being piloted in certain schools across Tamil Nadu and Karnataka. The Telangana State Government has also introduced a CV based attendance application at the end of 2023, which attempts to address the highly time-consuming task of attendance taking and reporting.

Other efforts that the panel found attractive and could benefit from further technology investment included offline educational applications and Indian language learning content generation (machine translation, auto-subtitling, and sign-language generation).

The NEP Project: School Complex Digitization Pilot with Moinabad School Complex

After a number of school visits and multiple interactions with govt officials at different levels, we proposed the deployment of a centralized school complex administration and learning effectiveness system. This is to enable the district heads, complex heads, the school headmasters and teachers to digitally store, access, and generate crucial insights from the data recorded on a regular basis. The intended outcomes of this project is not only to create a reliable database structure which would help govt officials in data-driven decision making, but also at a lower level help teachers, students and parents to get a better understanding of their own performances.

Along with administrative features, like aggregated numbers from the data records, the system has also developed certain learning effectiveness tools aligning with the NEP 2020.

Those are as follows:-

- *Ask Agastya: an intelligent caller response:*

The initiative of “Ask Agastya” is aimed at creating an “Any Time” learning resource/platform, especially for rural school students with an automated voice response system in their vernacular languages (currently in Telugu).

- *Automated Attendance and Attention Tracking:*

The project proposes a framework for accurate, low-cost, and scalable computer vision-based attendance tracking in classroom using “Face Recognition” by recording both the physical (attendance) and mental (attention) presence of students throughout a period.

- *Teaching / Conversation Assessment Tool:*

The module is being developed to analyse the conversations taking place in a classroom and extract useful insights regarding the learning of students in forms of engagement, discourse, and understanding of the whole class.

- *English Language Learning Tool:*

This project has developed a teaching assistance tool for the teachers to teach English language with predefined set of sentences. It works by comparing the speaker's speech with an expert's speech, to provide feedback on the pronunciation and fluency corrections.

Learning from Users: Leveraging Existing Platforms for EdTech Impact

The GenAI solutions require significant further effort to make them field ready at scale. Their marketed capabilities and actual abilities have a large disconnect that must be addressed, so that solution designs involving GenAI start providing realistic performance expectations. The needs and preferences of the user base also must be taken into consideration, such as the findings from the Annual Status of Education Survey, conducted across India by Pratham, that show over 90% of the userbase for educational software was from WhatsApp and YouTube.

This points to a definite need for the technology developers to re-visit how their users will be interacting with their application as well as what their expectations are for these applications, and how can they as technology developers integrate their tools into these larger existing userbases to maximise their impact.

D. Future for Innovation in Education: Things to be taken into account for addressing immediate needs

The final part of the roundtable discussion revolved around determining the major problems that could benefit from AI solutions, possible impact, and potential hurdles to pay attention to and address.

AI assistance has to Amplify Expertise for Maximizing Impact on ground

The hype around GenAI has masked the actual usability of these models in real world scenarios and what exactly are their capabilities. Though these models have large untapped potential, these models are more akin to highly advanced search engines and would find better use in assistive roles rather than making creative decisions. These AI tools must be utilised for scaling of human expertise rather than replacement. Potential use cases involve solutions such as for personalised content generation, assessment, auto translation of content to Indian languages (text, audio, and video), reliable content digitisation tools, etc.

Virtual education platforms and solutions must also be continued to be improved upon to account for unforeseen circumstances and capitalize on the user empowerment offered by such platforms that have shown to improve inclusivity of patients in the medical fields. These platforms could also build the required ecosystem where the AI tools can shine.

Inclusivity, Accessibility, and Scalability to be at the Core while Designing EdTech solutions

Solutions must also take the actual field usage scenarios and broader population into account rather than specific groups, they must be built with inclusivity, accessibility, and scalability in mind. The solution designs must also be inclusive of physically and mentally handicapped individuals who have broadly been neglected by most new technology solutions. The nature of the solutions must be effectively communicated to the populace and should also be accompanied with the necessary training and infrastructural facilities to remove the fear of technology from the user base and allow for maximized usage of these solutions.

Improve Model Reliability in Tools to ensure Effective use in Schooling System

Before some of the content generation tools proposed above can be used in schooling systems, improvements are needed in terms of model reliability, not just for GenAI content generation but even for machine translation engines. This is especially important in the Indian context with most translated content being rephrasing and interpretations rather than exact translations, corrupting the reliability in some cases for the models developed using such data sources. Efforts must also be taken for improving the GenAI systems to make them child safe, through either model improvements, pipelines for forced reliability of content generated such as retrieval augment generation (RAG), etc.

Large-scale Governance solutions requires Early Advocacy and Effective Collaborations within Stakeholders

Governance at scale is also an important aspect that must be considered when developing these solutions and can highly benefit from technology. Early advocacy with policy makers must be carried out to place the required regulatory systems in place for accountability and reliability of the systems developed. The solution development process must be a collaborative effort between policy makers, developers, and end-users.

Finally, it is important that technology must not be pushed for technology's sake.

Closing Remarks

Subsequent to the roundtable, the Raj Reddy center will consider building emerging research-based solutions that can address some of the needs discussed. The center will also make various stakeholder collaborations to explore jointly and develop any possible solutions in the area.

One of the major discussion points in the roundtable was to make solutions inclusive enough for catering to the needs of specially abled children also. Deaf and hard-of-hearing children deserve equal access to education, and technology can bridge that gap. Special language tools can be built in Indian Languages, along with scope for translating spoken language.

Few initiatives or projects that can be considered are:

1. Generating Subtitles of Learning Tutorials in different Indian Languages
2. Auto-generating Sign Language videos along with subtitles
3. Piloting the System for Effective Learning and School Complex Administration platform
4. Expanding the English Language Learning tool to other Indian Languages

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Moderator:
Viiveck Verma - Founder Upsurge, Social Impact Investor & Leader

Panel Members:
NGOs: Santhosh Gulla (CEGIS); Nikhil Gampa (Nirmaan); Praveen Kumar (Room to Read)
Academicians: Venkatesh Chopella (IIIT-H); Sourabh Todariya (IIIT-H)
Innovators: Suraj Meiyur (Next Skills 360 EdTech Private Limited); Rennis Joseph (Ignis Careers); Mallika (Radius Education)
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