TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN EDUCATION

PART 2

OPTIMISING BENEFITS AND ADDRESSING CHALLENGES

25th September 2024

Webinar Report

Moderator
PRANAV SHARMA
Author, Astronomer,
Science Historian
India

TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN EDUCATION

| PART 2 |

OPTIMISING BENEFITS AND ADDRESSING CHALLENGES

Panelist
SUHANI AHUJA
Student
Vasant Valley School
India

Wednesday, 25 September 2024
5 PM IST

Panelist
DR. AMARENDRA P. BEHERA
Joint Director
CIET, NCERT
India

In this second part of the series will feature a diverse group of experts, including technologists, course content creators, and policymakers. This session will focus on how these professionals are addressing the needs and challenges faced by those within the school ecosystem, and how they are working to optimise and actualise the use of technology and AI in education.

Panelist
PROF ESWARAN NARASIMHAN
Professor
CSE, NIIT University
India

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INTRODUCTION

On September 25th, 2024, Pallavan Learning Systems hosted its 16th webinar on the theme, "Technology and AI in Education Part 2: Optimising Benefits and Addressing Challenges'' in association with Ritinjali and Centre for Escalation of Peace.

This two-part webinar series was designed to provide a nuanced understanding of how students, teachers, and school leaders are using technology and AI in education and how coders, IT specialists and policymakers are responding to refine its application in the educational field.

In the first part of the series, the panellists – consisting of a student, a teacher, and a school leader – discussed how technology and AI are transforming education. They highlighted the benefits such as personalised learning experiences, innovative teaching learning tools, and improved administrative efficiency. However, they also addressed the challenges that come with these advancements, including increased plagiarism, diminished social skills and mental health issues among students, a steep learning curve and potential burnout for teachers, and cybersecurity and privacy concerns for school administrators.

This second part of the series featured a diverse group of experts, including technologists, course content creators, and policymakers. This session focussed on how these professionals are addressing the needs and challenges faced by those within the school ecosystem, and how they are working to optimise and actualise the use of technology and AI in education.

ABOUT THE SPEAKERS

Moderator: Pranav Sharma
Author, Astronomer, Science Historian, India

Pranav Sharma is an astronomer and science historian known for his work on the history of the Indian Space Programme, with a specialisation in international networks of science and technology. He has curated the Space Museum at the B. M. Birla Science Centre (Hyderabad, India) and led several exhibitions on Indian Space History in collaboration with ISRO, CNES, ESA, and the European Union Institute.

He was the In-charge of the history of the Indo-French scientific partnership project supported by the Embassy of France in India. He was also the former Member Secretary (Policy, Transdisciplinary Disruptive Science, and Communications) for G20-Science20. Presently, he is the Co-Lead of the Caltech History of Data-Driven Astronomy Project. He also serves as the Policy and Diplomacy Advisor to the United Nations International Computation Centre, Advisor to the France India Foundation, and Scientific Advisor to Arc Ventures.

He has co-authored the book, 'Essential Astrophysics: Interstellar Medium to Stellar Remnants', CRC Press, 2019. His upcoming books include 'History of Neutrino Research' (with Prof Takaaki Kajita) and 'History of 21st-century Science in India'.

Panelist: Suhani Ahuja
Student
Vasant Valley School, India

Suhani is a school student, Head of the Technology Council, and an avid filmmaker. With a passion for storytelling and digital media, she explores the intersection of film and artificial intelligence, using AI for various creative processes, including digital art. Suhani actively integrates emerging technologies into both personal projects and school initiatives, showcasing the transformative potential of AI in art and education.

Panelist: Dr. Amarendra P. Behera
Joint Director, Central Institute of Educational Technology (CIET)
National Council of Educational Research and Training , India

Dr. Amarendra P. Behera is the Joint Director at the Central Institute of Educational Technology (CIET), a part of the National Council of Educational Research and Training (NCERT). He holds a Bachelor's in Education from Utkal University, an MA in Education from Panjab University (where he won the University Gold Medal), and both an M.Phil. and Ph.D. in Education from Kurukshetra University.

Starting his career as a lecturer, Dr. Behera joined NCERT in 1996 and has since progressed to become a Professor of Educational Technology. His work spans educational technology, media integration, and ICT in education, contributing significantly to the development and dissemination of audio-visual materials, online courses, and teacher training initiatives. He has been actively involved in promoting the vision of Digital India and the National Education Policy (NEP) 2020, particularly through projects like DIKSHA, ePathshala, and PMeVIDYA.

Dr. Behera has been recognized nationally and internationally, receiving the UNESCO King Hamad Bin Isa Al Khalifa Award and the Digital India Award. His research and expertise continue to shape the integration of technology in education across India and beyond.

Panelist: Prof Eswaran Narasimhan
Professor
Computer Science and Engineering, NIIT University, India

Prof Eswaran Narasimhan has G Diploma, Managementfrom IIM Ahmedabad, MTech, Dairy & Food Engineering from IIT Kharagpur, BTech, Agricultural Engineering from IIT Kharagpur. He is Professor, Computer Science and Engineering at NIIT University (NU). He has 39 years of experience in academia and consulting. His research areas are centred around understanding internet behaviours, promoting innovation and developing algorithms.

Apart from his academic pursuits, Prof Eswaran has been consulting on information systems planning with companies in various manufacturing industries as well as in the banking sector. He has also delivered complex algorithms for various manufacturing processes and their optimisation, such as deckle optimisation, cargo scheduling and multi-factor authentication.

WEBINAR SESSION

The Role of AI in Modern Education

The discussion around Artificial Intelligence (AI) in education has gained urgency post-2022 due to its rapid integration into education systems worldwide. The critical question we now face is: how do we balance technological integration with the need for human-centric learning environments? This issue is especially significant in education, where creativity, intelligence, and emotional engagement thrive on human interaction, empathy, and personal connections. The challenge is to ensure that AI, with its growing influence, complements rather than hinders these essential aspects of learning.

This webinar focused on how educators, policymakers, ethicists, and technologists can foster AI integration in ways that enhance creativity, critical thinking, and intelligence

without compromising the core human elements of education. A crucial aspect of this conversation is recognising the potential drawbacks AI presents, particularly when it comes to creativity and emotional development. The key is ensuring that AI serves as an augmentative tool—not a substitute—for human interaction. Creativity is inherently human, driven by personal experiences and nuanced interactions that machine learning algorithms, at present, cannot fully replicate. Therefore, educators must remain mindful of how they incorporate AI into curricula, ensuring students remain active participants and use AI to enhance, not diminish, their learning.

Addressing the Digital Divide in AI-Driven Education

The discussion kicked off by examining how educators and learners can balance the integration of AI with the need to preserve human-centric learning environments, particularly in subjects that rely heavily on creativity and emotional intelligence. A broader issue discussed was the question of equitable access to AI. While AI holds transformative potential in education, it also risks deepening existing inequalities. Students in rural and underprivileged areas often lack access to the technological infrastructure necessary to benefit from AI-driven educational tools. This digital divide risks further marginalising disadvantaged communities and widening the education gap between urban and rural, wealthy and underprivileged students. Policymakers must address this challenge by ensuring AI provides better resources for all students, regardless of their background, thereby narrowing rather than widening the divide.

Ethical concerns also formed a significant part of this conversation. The rapid integration of AI in classrooms raises questions about data privacy, algorithmic bias, and the potential misuse of AI-based technologies. If not carefully monitored, machine learning algorithms could unintentionally reinforce biases in student assessments or

learning outcomes. Addressing these ethical challenges requires robust frameworks to ensure fairness, transparency, and accountability in AI systems.

At the core of this discussion was the recognition that education is profoundly human rooted in relationships, interaction, creativity, and intelligence. AI, while a powerful tool, cannot and should not replace the nuances of human interaction.

AI as a Creative Starting Point

Sohani Ahuja, speaking from a student's perspective, emphasised the importance of human interaction in education. She acknowledged that AI cannot replace this interaction but argued that AI is inevitable in education. Rather than resisting AI or seeing it as a threat to human interaction, Sohani believes it can be a valuable starting point, especially in creative subjects. As a digital artist, she shared that while AI can help kickstart the creative process, it is not a substitute for the full creative journey, which remains deeply human.

AI's Transformative Potential in Indian Education

Dr. Behera highlighted the transformative potential of AI in education, especially in a country like India with vast diversity among students and teachers. AI, machine learning, and robotics can support equitable, quality education on a large scale, particularly in line with India's National Education Policy (NEP) 2020. The NEP emphasises the integration of technology from primary schooling through higher education to bridge the educational divide. Citing examples, Dr. Behera shared how AI had enabled NCERT to translate textbooks into 22 Indian languages, broadening access to educational resources. He stressed the importance of ethical use, safety, and security measures in AI adoption.

Prof. Eswaran Narasimhan expanded on the discussion by addressing the challenges posed by AI. He traced the evolution of digital inequalities, from issues around access to hardware and software to the current divide concerning access to quality data. In the AI era, having access to high-quality, ethical data becomes critical. The challenge lies in ensuring that AI systems are trained on accurate and inclusive data to avoid perpetuating existing biases and errors. He emphasised the importance of discerning right from wrong in an AI-driven world, underscoring the role education plays in fostering this critical thinking ability.

The conversation also delved into strategies for ensuring equitable access to AI-driven education tools, especially for students from rural or underprivileged backgrounds. Dr. Behera pointed out that initiatives such as Digital India, led by the Government of India, are designed to bridge the digital divide. The National Digital Education Architecture (NDEAR), developed by the Ministry of Electronics and the Ministry of Education, aims to provide cutting-edge technology and resources across the country. AI-driven tools like the "Jaadui Pitara" mobile app offer innovative solutions for parents and teachers, using AI bots to create customised stories for children or assist teachers in developing lesson plans for students with special needs. These AI tools are designed to make learning more accessible, inclusive, and personalised.

Dr. Behera shared how platforms like Diksha, India's largest digital education infrastructure, are integrating AI and machine learning to improve access to educational resources. Diksha's AI-powered search engine helps students and teachers easily access a wide range of learning materials, from textbooks to videos, enhancing the educational experience for millions of users daily.

The discussion began with a query about the extent of AI integration in rural India. It was noted that the Indian government has established the Vidya Samiksha Kendra portal, designed to integrate students and teachers, thereby enabling data-driven

decision-making. The Diksha platform is pivotal in delivering educational resources offline, ensuring that even schools without internet access can utilise materials via small hard disks, laptops, or desktops. This approach allows stakeholders in remote areas to access crucial resources.

Another significant initiative is the Nistha app, which provides offline training modules for school heads and teachers to promote wholistic advancement. This ensures that educational resources are available irrespective of geographical challenges, benefiting both rural and urban students.

The discussion then transitioned to the importance of data-driven decision-making within the educational landscape. Participants contemplated the ethical frameworks necessary for deploying technologies, machine learning algorithms, and AI tools in classrooms, particularly in schools. A primary concern raised was how to ensure data privacy during this integration.

From an educator's perspective, two critical elements were highlighted: the breadth of teachable topics and the development of soft skills. While narrow subjects like history and science have clear resources, students also acquire a myriad of soft skills—such as observation and innovation—that cannot be easily quantified. This raises questions about the overarching goals of educational innovation. Participants questioned whether current designs prioritise efficiency or usability among diverse learners, noting that students often struggle to discern between beneficial and detrimental outcomes.

The conversation turned to the significance of narratives taught in schools, which profoundly influence a child's future. The term "narrative" is frequently misused, leading to conflicting perspectives. Participants noted that while subjects like math

have definitive outcomes, teaching history is much more subjective, leading to potential disputes regarding content and representation.

Experiential Learning

The National Education Policy (NEP) 2020 was discussed, emphasising its wholistic approach to education and focus on experiential learning. A critical consideration is the source of experiences integrated into AI models: Are they reflective of urban students' experiences, or do they account for the diverse backgrounds of students from rural areas? This brings to light the challenge of providing relevant and localised data sets to students across different states.

The necessity of integrating local knowledge into educational resources was stressed. While translation can provide access to broader narratives, it often fails to localise content, leaving significant gaps in students' cultural understanding. Participants emphasised the need for technological solutions that incorporate regional folklore and narratives to enrich learning experiences.

Addressing Information Overload

The discussion also addressed education amid information overload and technological excess. Educators identified three key focuses: improving students' comprehension skills, teaching them to synthesise information from multiple sources, and enhancing their communication skills. This includes effective data visualisation and storytelling, ultimately leading to coherent decision-making abilities.

Gödel's incompleteness theorems were referenced, highlighting the distinction between what is "true" and what is "actual" in the context of information overload. The

implication is that AI and technological interventions must navigate this complexity to maintain educational integrity.

From a student's viewpoint, several key concerns regarding AI in education emerged. Over-reliance on AI was highlighted as a major issue, potentially diminishing creativity and critical thinking skills. Students expressed the risks of burnout and aggression when separated from their devices for extended periods. Furthermore, concerns about privacy were raised, with students often unaware of how their personal data is used when engaging with AI tools.

Another area of concern is copyright and plagiarism. Students must recognise that while AI-generated content is accessible, it is not necessarily free to use. This underscores the importance of understanding copyright laws and the implications of plagiarism, particularly with tools like Midjourney and DALL-E.

Participants discussed how the definition of plagiarism is evolving due to AI's influence. Students must be vigilant in discerning the quality and source of information generated by AI to avoid inadvertently committing plagiarism.

The Importance of Critical Thinking

Educators stressed the need for students to develop the ability to differentiate between half-truths and facts. With AI providing generalised answers, students must engage critically with the information they receive to draw accurate conclusions.

The conversation concluded with strategies for ensuring students remain active creators rather than passive consumers of AI-generated content. Students should create their own AI tools and actively engage with information rather than merely accept it.

Q&A

Q: You've seen the effects of globalisation on cities, where Gurgaon looks the same as Hyderabad, and both resemble Detroit. So how do we ensure that AI is leveraged to amplify human creativity, instead of homogenising it, which is the most imminent danger with artificial intelligence or machine learning tools? What are your thoughts?

A: *Prof. Eswaran N:* As I mentioned earlier, there is a real danger of homogenisation. When using increasingly popular AI tools, everyone ends up referring to the same corpus of data, often arriving at similar solutions. Over time, these become accepted as the standard until circumstances change and this approach is viewed as inadequate. This shift occurs when we encounter new and unforeseen challenges—problems that are so novel they have no historical precedent. It is only then that human ingenuity is truly called upon.

To reference the old adage, "necessity is the mother of invention," when there is little necessity, innovation tends to be stagnant. We must consciously push ourselves to step back and approach problems from fresh perspectives each day. In the future, we will face many unimaginable issues—what we see as solutions today will likely become the problems of tomorrow. If AI is used to address problems only in the short term, those solutions will eventually become the new issues. And as long as we rely on AI without considering the long-term impact, we'll find ourselves in a perpetual cycle of solving yesterday's problems with today's tools, without truly resolving them for the future.

Q: How do you foresee the role of artificial intelligence evolving in terms of personalised learning experiences in the near future?

A: *Suhani Ahuja:* AI is increasingly positioning itself to work alongside teachers, if not directly in place of educators in some aspects. Personalised learning is gaining popularity, especially in classrooms where not all students grasp subjects at the same pace. You can't halt the entire class to cater to a few struggling students, but with AI's algorithms and pattern recognition, it becomes much easier to tailor learning to each student's needs.

For example, by feeding data into the AI about a student's progress, the AI can generate a personalised lesson plan that helps the student catch up. The teacher remains integral to the process, but AI simplifies it by creating a customised learning experience that can be revisited by the student as many times as necessary. This kind of personalisation ensures that every student, regardless of their learning speed, can eventually grasp the same concepts and stay on par with the rest of the class.

Q: Prof. Eswaran, do you have a comment on the above above and what Suhani mentioned?

A: *Prof. Eswaran N:* AI can certainly track how students have learned and performed previously, using that data to craft a tailored plan. We know there are around 14 or 15 major learning styles, and this is where AI can really help by fine-tuning how content is delivered. Whether it's auditory, visual, or computational, AI can adjust the delivery to suit the student's preferred learning style. This ensures that all students—whether they're slow or advanced learners—are equally well-equipped with the same knowledge, having absorbed it in the way that best suits them.

Q: We've reached a point where machine learning algorithms and AI are indispensable. There's no stopping an idea whose time has come, and we're far beyond that point. However, some nations still maintain strict controls over the use of gadgets in schools for various reasons. Tools like AI often require a medium—be it a

mobile phone, a laptop, or other smart gadgets. What are your thoughts on this, especially for those in the education sector?

A: *Prof. Eswaran N:* When it comes to devices and their usage, there are two key points to consider: devices for learning and comprehension versus devices for communication. There's a fine line between them, but if we manage to eliminate the distractions associated with communication—such as the urge to chat with others or post updates—we can focus devices on the learning aspect. The device itself isn't the problem; it's how we use it.

Allowing devices for research, comprehension, and learning, while limiting their use for communication or distraction, could be a solution. But defining what constitutes a distraction is tricky. Talking to others and sharing ideas is also a form of learning, which creates a conundrum. So, while differentiating between these aspects is beneficial, it's not easy to implement.

In the real world, open-book exams are here to stay because we now have access to vast resources like ChatGPT and Google. There's no longer any point in focusing on rote learning and memorisation. Those methods are becoming obsolete.

Q. To reframe the question, we should ask ourselves: how much AI is too much? How much information is too much for us? Rather than choosing one side of the debate, why not use both options?

A: *Suhani Ahuja:* Yes, excessive screen time can impair cognitive abilities, but we can also view AI as a digital mentor or tutor. AI can assist us by explaining concepts line by line or paragraph by paragraph. This way, we can retain our originality and creativity while still receiving support from AI. Instead of relying on AI to provide us

with all the answers, we can use it to guide our thought processes and enhance our understanding, ultimately boosting our critical thinking and logical skills.

CONCLUSION

The webinar illuminated the significant interplay between technology and education, particularly from the consumer perspective. The discussions offered valuable insights from various stakeholders, including policymakers, content creators, and IT specialists, addressing the day-to-day challenges posed by technology. A key takeaway was the irreplaceable nature of the human touch in education, underscoring the potential of technology to serve as a digital mentor, thereby enhancing learning experiences rather than replacing traditional methods.

Moreover, the ability to translate educational materials into multiple languages was recognised as a powerful advancement, promoting accessibility and inclusivity in learning. However, it is essential to recognise that the algorithms and data driving these technologies are inherently human creations, subject to biases and errors. This realisation calls for a critical evaluation of how data is utilised and the transparency of these processes.

Moving forward, it has become crucial to focus on three core competencies: the ability to sift through information effectively, make informed decisions, and communicate those decisions clearly. By cultivating these skills, learners could navigate the complex digital landscape with greater confidence and efficacy. Overall, this enriching dialogue provided a foundation for further exploration and development in integrating technology meaningfully into education, ensuring that it complemented the essential human elements of teaching and learning.

SUMMARY

On September 25th, 2024, Pallavan Learning Systems hosted its 16th webinar on the theme, "Technology and AI in Education Part 2: Optimising Benefits and Addressing Challenges'' in association with Ritinjali and Centre for Escalation of Peace.

This second part of the series featured a diverse group of experts, including technologists, course content creators, and policymakers. This session focused on how these professionals are addressing the needs and challenges faced by those within the school ecosystem and how they are working to optimise and actualise the use of technology and AI in education.

The webinar placed a significant emphasis on ensuring equitable access to AI-driven educational tools, particularly for students from rural and underprivileged backgrounds. There was a call for policymakers to address these issues, ensuring that AI-driven education remains accessible to all, especially those from disadvantaged backgrounds. The session also touched upon the importance of designing AI systems that are accessible to all students and are built for broader effectiveness rather than mere efficiency.

The discussion then centred on the challenges that AI tools, such as ChatGPT, pose to traditional learning approaches, particularly the concern that reliance on AI could reduce the value placed on hard work. A key segment of the webinar explored the integration of AI in education, stressing the need to strike a balance between technology and human-centred learning environments. Panellists discussed potential drawbacks, such as the inability of AI to replicate human interaction and creative thinking, alongside concerns about data privacy, algorithmic bias, and the risk of misuse. The discussion highlighted the need to focus on fostering AI integration in

ways that encourage creativity, critical thinking, and emotional intelligence, while preserving the human aspects of education.

The panellists discussed the ethical use of AI, cautioning against the perpetuation of errors and emphasising the need for individuals to critically evaluate the outputs generated by AI. The conversation highlighted the importance of monitoring machine learning algorithms carefully to avoid reinforcing biases, particularly in student assessments. The webinar also explored other potential downsides of relying on AI for learning, including over-dependence, privacy concerns, and copyright issues. There was a particular focus on the importance of educating students about the ethical use of AI-generated content, particularly in relation to plagiarism and intellectual property. Challenges around the precision of AI-generated answers were also raised, with a warning that AI can sometimes blur the lines between facts and fiction if not used in the proper context. However, the panel also acknowledged the potential of AI to provide personalised learning experiences catering to diverse learning styles.

A discussion on the difficulties of teaching abstract subjects like history emphasised the need for experiential learning. The challenge of translating complex ideas such as ethos and narrative across different languages and cultures was noted, alongside the difficulty of teaching concepts like honesty and imperfection. There was also concern about the increasing difficulty students face in handling information overload and the need for enhanced communication skills.

The final part of the discussion focused on the balance needed between the use of technology in learning and the negative effects of excessive screen time. There was a suggestion to differentiate between device usage for learning and for communication, underscoring the need for a balanced approach. The idea of using technology as a 'digital mentor' to enhance cognitive skills was also proposed. The session closed with a reminder of the importance of preserving the human element in education, even as

technology continues to evolve. There was a unanimous recognition of the ongoing need to address the challenges of AI in education, while optimising its potential benefits to enhance learning experiences for all students.

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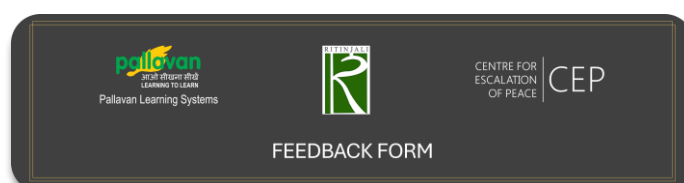
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