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Mugdha Sharma, J K Verma and Prem Kumar Kalra
G-Local Classroom: 360-degree Transition of Education

Bhaskar K Pandya, Kaushik R Trivedi and Anil S Patel
Enabling the *Atmanirbhar Bharat* by Honing Creativity and Innovation in the Undergraduate Students Enrolled in Professional Courses at CHARUSAT: A Case Study—Part II

G Ramadas
Navigating the Copyright Crossroads: Libraries and Intellectual Property in the Digital Age

Preeti Malik and Amit Gautam
Exploring the Pedagogical Potential of Artificial Intelligence, Augmented Reality and Virtual Reality to Enhance Teaching and Learning Practice

Chaitali Sharma
At the Crossroads: Artificial Intelligence in Education Faces Both Optimism and Concern
– Communication

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In This Issue

CONTENTS PAGE

Articles

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G-Local Classroom: 360-degree Transition of Education

Mugdha Sharma*, J K Verma and Prem Kumar Kalra*****

The classroom serves as a venue for students to engage with their peers and educators. Rabindranath Tagore, the great Indian Poet and thinker, envisioned an open-air classroom where students and teachers interact with each other and in the presence of Nature. In this setting, multiple educators can contribute to teaching specific subjects through various forms of expression, including poetry, visual arts, performing arts, and multiple languages. This innovative approach fosters creativity, curiosity, and a constructive perspective on the material to be learned. The proposed model allows students and teachers to assume distinct roles, enhancing authentic experiences and experiential learning while providing an expansive platform to integrate diverse learning methods and pedagogies. Technological advancements have been periodically introduced to facilitate teaching, learning, and feedback for both educators and students, promoting continuous improvement and deeper cognitive engagement within the classroom. Envision a classroom that has access to the natural world, global cultures, and diverse lifestyles from around the globe; this comprehensive perspective on learning and knowledge assimilation can undoubtedly create vast opportunities for both students and teachers. Moreover, strategies for knowledge acquisition, generation, and dissemination open limitless avenues for research and integration, enhancing our understanding of life and improving its quality. This global classroom, which connects local experiences to global contexts, can serve as a landscape for all to learn, think, and understand without limitations, thus earning the designation of a Global Classroom.

The changes that have swept from early childhood initiatives through higher education institutions have started changing the educational landscape and sector over these years. The Fourth Industrial Revolution (4IR) is characterized by disruptive technologies, processes, and practices. Chaka, in 202Ri0, listed light artificial intelligence, machine learning, and algorithms as the three most appropriate technologies.

Incorporating these technologies requires updating educational systems, starting with the organization and management of the classroom, evaluation, pedagogy, ethics, and professional development, along with the ability of complex reasoning, communication, and

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* *Faculty of Education, Dayalbagh Educational Institute, (Deemed- to- be University), Dayalbagh, Agra- 282005 (Uttar Pradesh). E-mail:sharma.mugdha24@gmail.com*

***Head, Department of English, Dayalbagh Educational Institute, (Deemed- to- be University), Dayalbagh, Agra- 282005 (Uttar Pradesh). E-mail:jyotikumarverma@gmail.com*

****Former Director, IIT Jodhpur. Currently, Senior Director, Dayalbagh Educational Institute, (Deemed- to- be University), Dayalbagh, Agra- 282005 (Uttar Pradesh). E-mail: drpremkalra@gmail.com*

remote global leadership skills (González-Pérez, L.I., & Ramírez-Montoya, M. S., 2022). Emerging technologies such as artificial intelligence, robotics, the internet of things, virtual and augmented reality, and old technologies together have found new applications in the field of education, bringing an upheaval in basic assumptions. Emerging technologies are transforming traditional educational paradigms, marking an evolutionary path toward a more interactive, accessible, and diverse learning environment. (Tiwai & Fahrudin, 2024). The ongoing low-cost connectivity, innovations in application tools, and progress in artificial intelligence have dramatically influenced the delivery of education. High-quality educational resources, including international content, laboratories, and libraries, are now easily accessible, allowing learners to connect with peers and educators worldwide. ICT facilitates pedagogical modifications that shift the focus from information memorisation to collaborative learning and problem-solving (Chandra,2024). As a result, various pedagogical approaches, tools, and strategies are being adopted to improve the effectiveness, engagement, and efficiency of teaching and learning. At present, many activities, cultural events, drama, sports, and culinary arts may be introduced into the learning experience to ensure students gain exposure in large ways in practice and principle. Several materials like recordings, podcasts, and debates on different topics in life support achieving profound knowledge of issue matters. The parameters of learning—such as pace, location, timing, and resources—are no longer restricted to traditional physical settings like schools, colleges, and universities. This transformation grants students the autonomy and flexibility to choose their preferred learning methods and to be assessed when they feel adequately prepared.

The idea of a school has also changed. Earlier, learning was limited to communication between students and teachers through black and green boards. Smart classrooms, ICT-enabled environments for learning, e-classrooms, and Intelligent ICT-based environments using digital technologies, the Internet of Things, robotics, and virtual and augmented laboratories have personalized education positively in addressing the unique needs of each student in this day and age. As per Chandra (2024), the use of ICT has become an integral part of the teaching-learning interaction, enabling more interactive exercises, facilitating a shift from teacher-centred to learner-centred teaching, and empowering students to participate in information processing. Sharma et al. (2011) emphasise that the use of ICT in the teaching and learning process affects changes in content and methodology. The integration of ICT inside a classroom empowers teachers to change their teaching methodologies and contents, while technology tends to engage learning actively, creatively, and authentically (Chandra, 2024). At the same time, ICT is reforming education, increasing student involvement, motivation, and performance, thus requiring teachers to be adaptable (Rahimi, 2024).

Global Classrooms-The G-Local Approach

Global classrooms have now become a concrete reality, facilitating collaboration among teachers, mentors, and students from diverse backgrounds. The findings of neuroscience have contributed to the understanding of how the brain works. It supports the process of the formation of connections, where the brain learns with the help of patterning. According to Jensen (1995), environmental events, such as experiences and the actions that you take, lead to changes in your brain, and the brain is continually making more connections based on how the individual interacts with the environment. The G-Local approach translates the natural tendency to connect, experience, stimulate, and share into the education system, which begins as early as the child starts exploring surroundings and starts creating patterns.

Global opportunities demand a comprehensive education from employees, which includes an understanding of global sensitivities, an appreciation for the interplay between local and global traditions, and familiarity with diverse learning methodologies. Consequently, students should not only grasp academic content and its practical applications but also delve into the history, languages, cultures, and civilisations of various nations. They must foster a continuous curiosity to learn about the elements necessary for achieving success on a global scale.

In navigating the complexities of knowledge within a context characterised by Volatility, Uncertainty, Complexity, and Ambiguity (VUCA), it is essential to establish a framework for Learning, Understanding, Assimilation, and Thinking through the lenses of STEM, STEAM, and SHAPE regarding knowledge ecologies. This approach underscores the importance of developing resilient capabilities in today's digital environment, which necessitates a transformation of teaching methodologies through intelligent, innovative, and thoughtful education that emphasises creativity, deep engagement, and critical analysis. Despite the advancements in tools and technologies designed to connect disparate populations and enhance information management systems, persistent challenges remain that require critical thinking to effectively utilise both personal and technological resources.

G-Local classroom approach diversifies the environment of the learner with the opportunity to interact with teachers, mentors, and students from diverse cultures and geography. It can be defined as the approach where the learner and their knowledge are identified as a node in the vast network, at both local and global levels, and connections are a natural pathway for evolving the learner and knowledge further.

The challenges faced by the world in present times are expected to become more vigorous in an accelerated timeline, requiring a universal approach and global consciousness. The ongoing battle of existence has demonstrated the impact of humans on nature and society- ethical concerns of AI, climate change, sustainability, war, human-caused disasters, and disparities across society call for individuals who work for the world with a holistic approach and the ability to collaborate and contribute. Hanushek & Woessmann (2023) emphasised how having a detailed understanding of the role information technologies play in the development of a digital economy is extremely valuable for the achievement of economic, social, and environmental objectives. Thus, globalisation of education through purposeful integration of technology can create global classrooms to make education more relevant for the future of the Earth.

A major part of the curriculum and goals of education are shared among different education systems; a proper analysis will aid in the identification of areas of collaboration. The global collaboration can be at three distinct levels based on the degree of collaboration.

Special

This level of collaboration is done when the area/activity identified is a unit of the course or an extra part covered for the achievement of the course outcome. This will include guest lectures, seminars, and presentations. Also, included in this category are the co-curricular activities from literary, music, arts, and creative domains or the celebration of important days and events.

Integrated

This level of collaboration is done when a major component of the course is completed with global partners. This will include an assessment after successful completion of the component. This may include short-term projects, components of an internship or practical work.

Inclusive

This level of collaboration is the ideal state where a major part of the program is completed in collaboration with the global partners. At the higher education level, this may lead to the affiliation of a program of study to two or more universities.

As opposed to the traditional mindset, globalisation of education can start as early as preschool education, where children can perform music, dance, drama, interact, and communicate with people from diverse backgrounds. According to Jensen, it is now known that incorporating intense emotions associated with celebration, competition, or drama can stimulate the release of adrenaline, which strongly enhances memory in learning. At the school level use of virtual visits, online collaborative games based on learning, the use of telepresence to give site visits, and small group-based projects or activities, including role play and drama, will promote understanding of culture and diversity, along with experiences that shape the learning of young minds.

G-Local Classrooms, Laboratories and Research Platforms

University internationalisation initiatives encompass programs for the exchange of students and faculty, site visits, cultural excursions, and various related activities. These efforts need financial investment from either organisations, students, or faculty members. An alternative economic approach to acquiring leadership skills, fostering an appreciation for transcultural knowledge, and gaining insights into globalisation is through global classrooms (GC) that use virtual and augmented reality. Global classrooms serve as a source of alternative content and courses that extend beyond the offerings of a specific institution. They ease collaborative learning through courses provided by multiple global partners, encouraging the generation of creative ideas stemming from cultural diversity and the sharing of solutions to local challenges as part of class assignments. The traditional model characterising student mobility has been hampered by financial constraints (Altbach & Knight, 2007). A global classroom provides cost-effective alternatives for students and staff to engage in collaborative learning without entering into a physical mobility arrangement (Marginson, 2019). Technology has become quite pivotal in bridging the temporal and spatial gaps between teachers and students. Modern technologies' implantation is actually contingent on the basic infrastructure and resources available (Tiwari & Fahrudin, 20024). Studies show that virtual learning environments allow significant intercultural engagements that enhance the appreciation of cultural diversity (Dewey & Duff, 2009). This development, and the advances in virtual and augmented reality to make global classrooms a possibility, have made global classrooms a current practice. Studies indicate that virtual learning environments facilitate meaningful intercultural exchanges, fostering greater appreciation for cultural diversity (Dewey & Duff, 2009). Synchronous methods such as live lectures, role-playing exercises, and panel discussions create easy interaction, while asynchronous means like discussion forums and collaborative projects provide flexibility and access (Garrison et al., 2000). These technological tools bridge geographical and temporal gaps, making quality education more inclusive and equitable.

The integration of international intellectual capital and intercultural elements into academic programs is essential, from a global perspective within local classrooms. By using technology, the concept of global classrooms has appeared, creating a collaborative learning environment that promotes co-learning, cooperation, and the joint creation of deliverables among participants. Integrating multiple global partners into the curriculum, global classrooms encourage students to collaborate for the development of solutions to local and global challenges. For example, a study conducted by Helm (2016) on virtual exchange programs demonstrated that students engaged in global collaborative projects exhibited higher levels of cross-cultural competence and adaptability. Dominant discourses, at times, may undermine non-Western paradigms in higher education, thus becoming a major challenge (Tikly & Barrett, 2011). Global classrooms consensually challenge such bias by promoting reciprocal learning amongst institutions from different cultural and geographical contexts.

Benefits of G-Local Approach

Skilling for the 21st Century

This is the century of skills, where no learner can survive and adapt in this fast-changing world without a set of skills, including the 4C's- critical thinking, collaboration, creativity, and communication. The primary determinant in the development of these skills is the level of exposure, opportunities to interact and process information, and thinking deeply and transforming knowledge into solutions for everyday problems and challenges. Global Classrooms have inbuilt characteristics and modes of working that develop these skills by giving enhanced learning environments where collaboration, communication, opportunities for critical thinking, and creative solutions are promoted.

Lab to Land and Land to Lab

Students need to learn real-life examples and how experiments in the laboratory can be scaled up to solve local problems and eventually become global analytical people. The problems in the neighbourhood can be better understood if students learn experimentation and expand experiments to explore real-life scaling up. This would lead to learning in the lab, conducting experiments, and implementing them in a larger context. Novel and new applications based on local requirements become affordable because additional resources are required for tweaking the existing outcomes to meet local requirements. Innovative practices evolve to share history, local stories, and social expression of visual and performing art, heritages, culture, and languages. Realities in these aspects can be observed through monuments and architecture of buildings, schools, and universities.

Earn and Learn & Learn and Earn

In a Global Classroom, since the activity size is huge, students get opportunities for education, research, and skill development using the latest tools. Their ability to work in diverse environments and level of exposure to knowledge, ideas, and problems enhance their skills for a global workforce. This pooled cloud of human resources across geographical boundaries manifests efficiency and integrity, leading to opportunities for internship and earning while learning & learning while earning. Work can be done from anywhere; multiple opportunities can be utilised to earn and continuously support higher goals of education at a low cost at various locations around the globe. Such a global classroom provides placement opportunities at a global level, which enhances the scope of finding global jobs, thus continuously improving education and the capacity to earn.

Creativity, Innovations, and Research Opportunities

Global Classrooms promotes collaboration among educators across different university departments by utilising four global modalities: culture, research, education, and business exchanges. These elements shape our approach to linking students, academics, and professionals worldwide, encouraging innovative teaching and learning practices while creating opportunities for international mobility.

Numerous countries and regions exhibit diverse cultures, languages, and innovations. The collaborative efforts of students and teachers from varied backgrounds foster the development of creative and innovative ideas, facilitating research and the simultaneous implementation of findings across separate locations, thereby enhancing the quality of research. Partners naturally evolve into co-researchers, synergizing their thoughts to undertake significant, high-quality projects while continuously refining their ideas. Student communities engaged in these initiatives gain international exposure without experiencing cultural shock, allowing them to relocate to various countries as needed. Such collaborations also inspire ideas for product development based on both local and global demands. Consequently, the costs associated with overhead, foreign exchange, and workforce required for project execution are significantly reduced, enabling more effective resource utilization. Over time, students, and teachers at various stages of research mature, ensuring that gaps do not arise in the pursuit of long-term objectives. These partnerships are thus meaningfully reinforced. Collaborative research conducted through global classrooms is both generative and progressive, benefiting from the diversity of the workforce involved. Additionally, locally published literature is strengthened, as the quality of research and benchmarks are influenced by international standards. Creativity and innovation arising out of local frugal practices become global and get integrated into global projects, significantly influencing several global players for learning, teaching, research, and businesses.

Global Consciousness and Citizenship

Global Classrooms foster students' understanding and appreciation of intercultural knowledge, which is essential for global consciousness. Culture is an integral theme across various academic disciplines, including language studies, business, engineering, design, tourism, and healthcare. Consequently, organizing a GC focused on cultural topics is not only well-received but also greatly enhances the adaptability of the individuals. While working in multicultural settings, the participants tend to follow the highest standards and converge to a globally acceptable level. This has a major impact on the social norms, ethics, value system they follow and their social sensibilities. As we take forward our Indian Knowledge System, integrating it with the Global Knowledge System will make it comprehensive and holistic. The approach and ability to integrate multiple perspectives for solving problems, along with respect for each other, will promote the preparation of a global citizen.

Languages

Students get opportunities to gain experience of a number of languages, signs, symbols, and expression styles in the global classroom and enhance reading, writing, understanding and various other communication skills. Initially, it develops lateral thinking and managing complex tasks. Then the knowledge grows organically to understand and think about the same thing in multiple ways.

Challenges of Global Classroom

Despite their numerous benefits, global classrooms face challenges, including technological disparities, language barriers, and resistance to pedagogical change (Veletsianos, 2020). Communicating with people from other cultures requires some basic understanding of their culture and language. One of the primary challenges of Global Classrooms is finding suitable overseas collaborators, institutes, teachers, and students. Engaging both formal avenues, such as the university's international office or school’s administration, and informal networks, including colleagues, past associates, and contacts made at conferences and seminars, enhances the likelihood of successful partnerships by using existing relationships. Other problems may be due to the lack of ICT-enabled infrastructure, though educational institutions have significantly focused on building ICT infrastructure in the last decade, the lack of ability to integrate technology into classroom discourse at times makes the existing infrastructure purposeless. Other problems associated with global classrooms are availability of content, resources, and training of teachers to adapt to the change in course design and delivery.

Solutions to Roadblocks

- ***Language Barriers:*** Artificial Intelligence technologies are now accessible for converting audio, video, and written content from digital blackboards into text, tailored to the local languages of both students and teachers, often at minimal expense. This advancement eases seamless communication among students, educators, and mentors, cutting barriers to interaction. Additionally, online examinations, home assignments, seminar discussions, assessments, evaluations, and personalized feedback can be efficiently generated to enhance individual awareness.

- ***ICT Infrastructure*:** The costs associated with Information Communication Technologies (ICT) have significantly decreased, enabling swift and cost-effective implementation. Moreover, remote-controlled laboratories are available, allowing students and learners to conduct experiments at their convenience and within their institutional times. The time needed for developing physical infrastructure can be minimized, allowing for a greater allocation of resources towards enhancing technological infrastructure instead of constructing traditional facilities for teaching and learning.

- **Online Resources:** The availability of affordable digital libraries internationally suggests that efforts to duplicate resources should be minimized to the greatest extent possible. The wealth of online content can serve as valuable study materials, while global classrooms can be used for seminars and group discussions, fostering a deeper understanding of the subject matter.

- ***Teacher Training & Support*:** Teachers are the backbone of any reform in the education system; thus, their support and training are crucial for the success of any such endeavor. Teachers should be prepared to open their classrooms to local and global communities for areas identified by them to create a sense of autonomy. Team teaching approaches could be integrated to help a teacher ease the burden of leading the entire initiative. Flexibility, clear guidelines, and support from the management will ensure a conducive teaching-learning environment and promote collaborations.

- ***Collaborations & Additional Support*:** Joint initiatives of national and international associations and affiliating bodies of schools and programs of study in higher education can play a pivotal role in creating local and global circles. They can collaborate to identify areas of the common core curriculum and organise co-curricular, lab, project, and research activities together, maximising the interaction and opportunity for learners to communicate and collaborate.

Alumni, friends, and well-wishers, along with various associations, groups, and organisations, can significantly contribute to fostering a supportive educational environment for students at home through Corporate Social Responsibility initiatives.

Initiatives in the field of internationalisation of education are being taken across the world, especially at higher education levels. The small, isolated islands of collaborations could be merged into a bigger network with the support of Intergovernmental or inter-organisational pacts at the formal level or the informal level between two or more institutes or even a teacher and an institute. The degree of collaboration from local to global regions is flexible and can be accommodated at any level. The drive behind this adaptation should be the realized gap in achieving the educational goals and its incompleteness. Any educational program can have a 360-degree impact when we step out of silos and connect the learners across diverse learning networks. Therefore, educational institutes at all levels have untapped potential to connect and create a change in basic assumptions in education by strengthening the role of local and global networks and significantly elevating the impact of education on an individual and society.

Conclusions

Technologies, tools, and agents are advancing rapidly, which presents challenges for the modular integration of new developments. Different countries adhere to varying benchmarks, regulations, and cycles of adaptability in development, indicating that a solely collaborative approach may encounter obstacles. Global classrooms should not merely replicate existing facilities; instead, they should aim to complement and enhance each other to elevate the learning experiences of students worldwide. Initially, it is essential to meet minimum standards and requirements before further resource enhancements can be implemented. While these classrooms may operate on a frugal basis, they can still be effective. Innovative and novel pedagogical methods are crucial, as the abundance of learning materials across nations necessitates diverse forms of expression, such as performing arts and visual arts, to deeply embed ideas and foster lifelong learning outcomes. The curriculum should maintain flexibility, yet it is imperative that a minimum number of credits from international and global classrooms be mandated.

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Dr Sistla Rama Devi Pani, Editor

Enabling the *Atmanirbhar Bharat* by Honing Creativity and Innovation in the Undergraduate Students Enrolled in Professional Courses at CHARUSAT: A Case Study

Part II[#]

Bhaskar K Pandya*, Kaushik R Trivedi and Anil S Patel*****

Building on the conceptual framework and foundational journey discussed in Part I, Part II of this case study focuses on analysing feedback from undergraduate students enrolled in the Creativity, Problem Solving, and Innovation (CPI) course at Charotar University of Science and Technology (CHARUSAT). The analysis of student feedback offers valuable insights into the perceived effectiveness of the course in achieving its objectives. It examines various aspects such as course content, teaching methodologies, overall learning experience, etc. The findings of this case study contribute to the ongoing discourse on educational strategies for fostering creativity and innovation among undergraduate students, particularly in the context of India's Atmanirbhar Bharat initiative. The detailed analysis of the feedback and its findings presented in Part II of the case study highlights the course's potential as a transformative tool in higher education to foster creativity and innovation in India.

Unique Strategy for the Implementation of the Course

It goes without saying that thoughtful planning and deliberation go into developing a special strategy model for carrying out a new course for learners. The unique strategic model was developed by Dr. Anil Patel, starting from the course design to classroom teaching in offline and online modes as well. The strategic plan of action to implement the course is as follows:

Need Assessment

Creativity flourishes in an atmosphere that encourages curiosity, experimentation, and open-mindedness. Embrace flexibility and adaptability, allowing the course to evolve based on the needs and interests of the students. Shortcoming of India's education system is that it teaches facts and tests mostly memory in exams where the following Human abilities are not developed: '*Yadshakt*i' which can help recollect and may help one pass some examinations and even get good grades; '*Samajshakti*' which is the ability for understanding without which one may pass exams, but it will not help one progress much in the chosen field much further as required in the job, career or life; *'Vicharshakti'* is the ability to follow up the understanding by further thinking and creatively solve problems; *'Kalpanashakti'* or ability to imagine will really help one much further for application of what one learns in newer and much improved way. In the same line, after realising the lack of ability to think creatively among Indian Graduates, Dr. Anil Patel and Dr. Asha Patel made the decision to design and donate a course on CPI in order to teach the upcoming generation of India on how to think creatively and solve problems that pertain to their everyday life as well as those of India.

Process of Course Design and Pedagogy

All the above-mentioned abilities are involved in what is generally known as Creativity, Problem Solving and Innovation. Innovative teaching strategies based on research-based resources were developed and tested during various Faculty Development Programmes before taking them to classrooms. The following resources helped Dr Anil Patel to design the course and its pedagogy:

- Latest books by researchers from universities, US Army and NATO researchers, prominent management consultant Edward De Bono, practice at Stanford d School, Etc.
- Latest results of "Cone of Learning" as to how learning takes place. Watching Videos retain information better than lectures.
- Case study method of learning as used by prominent business schools in the USA. Dr Anil

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**Dean, Faculty of Humanities, Charotar University of Science and Technology, Gujarat.E-mail: bhaskarpandya.cs@charusat.ac.in*

***Assistant Professor, Faculty of Humanities, Charotar University of Science and Technology, Gujarat. E-mail: kaushiktrivedi.cs@charusat.ac.in*

****Multidisciplinary R&D Expert (USA), Remote Adjunct Professor, Charotar University of Science and Technology*
E-mail: bhaskarpandya.cs@charusat.ac.in

Patel was at Stanford University to experience it.

- His 60 years of multidisciplinary R&D experience suggest the need to learn teamwork, skills to gather information, write a report and make an oral presentation.

The subject of creativity and problem solving was researched and published in several books by many in the USA. It added significant value to design the pedagogy and course material. These books form a part of the reference reading for the course.

Train the Trainers: Residential Faculty Development Programs

Residential *Faculty Development Programmes* on 'Creativity, Problem Solving, and Innovation' to train the faculty members to teach the course were organised at Charotar University of Science and Technology (CHARUSAT), Changa, during the academic years 2017-18, 2018-19, and 2019-20. Dr Anil Patel conducted all the Faculty Development Programmes to conceptualise the vision of the course; teach the course, and hone the necessary skills and competence among the faculty members to implement it in the undergraduate programmes of the university.

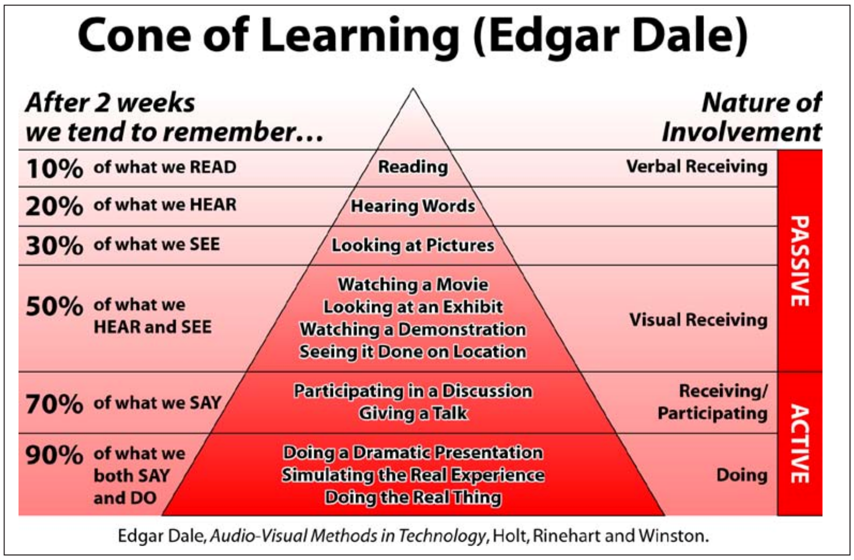
These residential Faculty Development Programs were unique in structure, and they covered all the aspects of creativity, problem solving and innovation. They provided a vital view on Need for Problem Solving and Innovation, Types and Styles of Thinking, Need for Creativity Education in real life, Visualisation Strategies–making thoughts visible, Mind Mapping, Scamper Technique, Lateral – Vertical – Divergent–Convergent Thinking, Logic and Reasoning, along with Case Studies on Contemporary Issues and Practices based on Indian situations. Besides, it focused on how to execute individual and group activities during the classroom sessions.

Unique Pedagogy Based on 'Cone of Learning' by Edgar Dale

American educator and audio-visual expert Edgar Dale developed the "Cone of Learning" as a visual presentation method in the 1960s (Figure-2). The cone of learning is based on research that shows that the more involved the learner is, the more likely they are to retain key learning information, skills, and strategies for utilisation. The theory states that rather than being passively involved in the learning process, students learn more effectively when they actively engage in it. A hierarchy of learning strategies is depicted in the form of a cone. Please note that the nature of involvement, as per the right of the cone and its corresponding learning effect on the left of the cone, clearly shows learning retention increases as one progresses from verbal receiving to visual receiving to active involvement, such as participating and finally actually doing.

The unique pedagogy of teaching the CPI course includes findings from the effectiveness of 'Cone of Learning'. It includes: Use of relevant videos to supplement the lecture on the goal of each class as learning tool; Involving students actively during the class by individual and especially group tests; Group test in each class as activity where each student must participate leads to group learning by doing; Slow learners are helped by fast learners and thus, retention is increased in each class. It also teaches teamwork and learning how to communicate and collaborate. Thus, the course is implemented through: Lectures through PowerPoint presentation; Video(s) on the different themes; Individual test on thinking or the theme for 5 minutes; Case study on the theme as per Harvard Business School method; and Group activity as a test on the theme for 20 or more minutes to teach collaboration and teamwork.

Figure 2: Cone of Learning Model by Edgar Dale



Edgar Dale, *Audio-Visual Methods in Technology*, Holt, Rinehart and Winston.

Quantitative Analysis of the Feedback of Students

The quantitative analysis of student feedback of 8,092 CHARUSAT students (Table-2) on Dr Anil Patel's Course on Creativity, Problem solving and Innovation from academic year 2017-18 to 2021-22 proves the effectiveness of the course in honing creativity and innovation skills among the students.

Table-2: Year-wise List of Students Provided the Feedback

No. of Students				
2017-18 December-May	2018-19 December-May	2019-20 December-May	2020-21 Jun-November	2021-22 July-November
1141	1367	1640	1923	2027

The feedback was collected employing a questionnaire with a five-point Likert scale. It is a type of questionnaire that collects responses using a five-point scale of agreement, starting from Strongly Disagree, Disagree, Moderate, Agree, and Strongly Agree. The summary of the statistical analysis of Mean/Standard Deviation of Various Factors is as follows:

As mentioned in Table-3, the mean scores across all of the factors are higher than 4.20, which indicates that the students have a positive opinion of the course (Factor 1), content (Factor 2), activities (Factor 3), videos (Factor 4), and pedagogy (Factor 5). Further, low standard deviation indicates that majority of the students' feedback are fairly consistent since the academic year 2017-18. The mean scores of all the factors in the academic year 2021–2022 has remained above 4.40, indicating the course's significance and effectiveness in the curriculum of UG programmes across the university.

The summary of the statistical analysis of the Mean/Standard Deviation (SD) of Various statements is as follows:

As it is derived from Table-4, the mean scores for statement-1 are higher than 4.30 over all 5 years, implying that the students have been exposed to new knowledge and practices. The mean score for statement-2 rises significantly every year and is, M= 4.01, M= 4.17, M= 4.4, M= 4.45, M= 4.45 in the years 2017–18, 2018–19, 2019–20, 2020–21, and 201-22 respectively. It indicates the significance of the content as per expectations of the students. For statement-3, student feedback (M = 4.50, SD = 0.54) on objectives of the course; for statement- 4, student feedback (M = 4.54, SD = 0.52) on organization of the content; and for statement-5 (M= 4.51, SD = 054) on topic relevance in academic year 2021-22 have received the highest score, which indicates the student satisfaction from the course. Further, low standard deviation indicates that majority of the students' feedback are fairly consistent since the academic year 2017-18.

Analysis of Table-5 indicates that the majority of students taking the CPI course have an opinion that their knowledge and competence (statement-6) have improved (Means score over 4.20). They have also provided positive feedback for activities (statement 7 has a mean score over 4.30) and participation/engagement (statement 8 has a mean score above 4.40) during the academic years 2017-18 to 2021-22. Additionally, the mean score (M= 4.26, M= 4.29, M=4.43, M=4.42, M= 4.48 in 2017-18, 2018-19, 2019-20, 2020-21, 2021-22, respectively) for statement-10 states that videos used during the course have enhanced their learning experience of the CPI course.

The mean scores for statements-11 and 12 are higher than 4.20 throughout all five years, suggesting that the videos employed for the teaching-learning

Table-3: Analysis of Student Feedback on Various Factors

	Year	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**
	No. of Students	**1141**	**1367**	**1640**	**1923**	**2027**
Sl. No.	**Aspect / Factor**	**Mean / Standard Deviation**	**Mean / Standard Deviation**	**Mean / Standard Deviation**	**Mean/ Standard Deviation**	**Mean / Standard Deviation**
1	Course	4.22/0.73	4.30/0.78	4.44/0.57	4.49/0.79	4.49/0.53
2	Content	4.24/0.91	4.31/0.79	4.45/0.58	4.44/0.98	4.52/0.54
3	Activities (Group/Individual)	4.34/0.76	4.38/0.77	4.46/0.57	4.52/0.68	4.52/0.53
4	Videos	4.25/0.81	4.27/0.86	4.41/0.58	4.56/0.39	4.45/0.55
5	Pedagogy	4.30/0.79	4.43/0.80	4.45/0.57	4.46/0.52	4.49/0.54

Table 4: Analysis of Student feedback on Statement 1 -5

	Year	2017-18		2018-19		2019-20		2020-21		2021-22	
	No. of Students	1141		1367		1640		1923		2027	
Sr. No.	Statements	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	The course exposed me to new knowledge and practices.	4.37	0.67	4.41	0.76	4.47	0.55	4.38	0.23	4.52	0.52
2	The course content matched with my expectations.	4.01	0.78	4.17	0.82	4.4	0.57	4.44	0.46	4.45	0.54
3	The objectives of the course were clearly stated.	4.27	0.75	4.33	0.76	4.46	0.58	4.47	0.35	4.5	0.54
4	Content was well organized.	4.34	0.78	4.39	0.77	4.48	0.56	4.24	0.26	4.54	0.52
5	Topics covered were relevant to me.	4.18	1.16	4.24	0.81	4.44	0.57	4.45	0.78	4.51	0.54

Table-5: Analysis of Student feedback on Statement 6 -10

	Year	2017-18		2018-19		2019-20		2020-21		2021-22	
	No. of Students	1141		1367		1640		1923		2027	
Sr. No.	Statements	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
6	Knowledge and competence in this subject matter has increased.	4.2	0.79	4.31	0.79	4.42	0.61	4.62	0.69	4.5	0.57
7	Activities were relevant to objectives.	4.34	0.76	4.36	0.77	4.46	0.56	4.47	0.78	4.52	0.52
8	Participation and interaction were encouraged.	4.41	0.75	4.44	0.76	4.46	0.56	4.58	0.83	4.53	0.52
9	Activities enabled me to assess my personal knowledge gaps.	4.27	0.79	4.34	0.78	4.45	0.59	4.72	0.98	4.51	0.54
10	Videos enhanced learning experience.	4.26	0.85	4.29	0.85	4.43	0.56	4.42	0.26	4.48	0.54

process are effective, suitable, and have simplified complex concepts of the course. Statement-13 and statement-14 indicate that students are satisfied with the instructor's problem-solving approach (Mean scores above 4.30) and the ability to explain the concept (Mean scores above 4.35). The highest Mean = 4.48, for statement-15 came from student feedback on the significance of the assignments and exam in achieving the course objectives in the academic year 2021–2022, which shows that the course objectives have been attained at the end of the teaching–learning process. Additionally, a low standard deviation suggests that the majority of feedback from pupils is fairly consistent and reliable since the commencement of the course in academic year 2017-18.

An increasing overall mean score (M=4.28 in 2017-18, M=4.34 in 2018-19, M=4.44 in 2019-20, M=4.47 in 2020-21, and M=4.49 in 2021-22) indicates students are providing higher ratings or more positive feedback for CPI as the years progress. This suggests a positive change in students' perceptions and experiences with the course. The rise in mean scores reflects the successful implementation of the course across the university. Further, low standard deviation (SD=0.8 in 2017-18, SD=0.8 in 2018-19, SD=0.57 in 2019-20, SD=0.56 in 2020-21, and SD=0.54 in 2021-22) in each passing year indicates that the majority of the students' feedback is fairly consistent since the academic year 2017-18.

Overall, an increasing mean score in feedback from students on the CPI course over the years indicates the efficacy of the course's materials, teaching, and overall learning experience. It indicates a dedication to outstanding practices, innovations

Table-6: Analysis of Student Feedback on Statement 11-15

	Year	2017-18		2018-19		2019-20		2020-21		2021-22	
	No. of Students	**1141**		**1367**		**1640**		**1923**		**2027**	
Sr. No.	**Statements**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
11	Videos were effective and apt for the content of the course.	4.27	0.77	4.26	0.84	4.39	0.58	4.34	0.34	4.44	0.55
12	Videos simplified complex concepts and were followed by necessary discussion.	4.22	0.8	4.25	0.87	4.4	0.6	4..39	0.57	4.44	0.57
13	Instructor was enthusiastic and had problem solving approach	4.31	0.8	4.39	0.83	4.45	0.56	4.58	0.67	4.5	0.52
14	Instructor had the ability to explain concepts in simple and clear terms.	4.39	0.78	4.48	0.76	4.45	0.56	4.7	0.45	4.48	0.53
15	Assignments and examinations were directly linked with the course objectives.	4.33	0.8	4.42	0.8	4.45	0.59	4.2	0.71	4.48	0.55

in teaching, and need-based pedagogy to the needs of students, eventually fostering innovation and creativity among undergraduate students of the university.

Social Relevance of the Course towards building *Aatmanirbhar Bharat*

The Atmanirbhar Bharat Abhiyaan, also known as the Self-Reliant India campaign, is the blueprint for the future India that the Honourable Prime Minister of India has in mind. The COVID-19 epidemic in India was fought with a special economic and comprehensive package worth $ 265 billion, which was announced by the prime minister on May 12, 2020. The *Aatmanirbhar Bharat* seeks to achieve self-sufficiency and viability for the country and its citizens. Five pillars serve as its foundation: (i) the economy; (ii) the infrastructure; (iii) the system; (iv) a thriving population; and (v) demand (Invest India: National Investment Promotion & Facilitation Agency of Government of India, 2020; Chavla, 2020). It is unthinkable to overstate the importance of creativity for *Atmanirbhar Bharat*. In order to realise the goal of being self-sufficient and inclusive growth, creativity is essential. Followings efforts should be taken to promote creativity and inventiveness among the students in India to strengthen the *Atmanirbhar Bharat* Campaign (Invest India, 2020): Fostering R&D and intellectual property; Promoting entrepreneurship; Promoting a culture of learning; Making the best use of resources; Empowering creative ideas and innovation; and Collaboration and knowledge sharing. Therefore, it is essential to look into the most fundamental issue of whether policymakers are adequately fostering and preserving India's creative ecosystem (Pednekar in Forbes, 2021). The vision of *Atmanirbhar Bharat* can be greatly influenced by including courses on skills development, such as creativity, entrepreneurship, communication, leadership, across the institutes of Higher Education in India. Even before this campaign, in 2017, a course on Creativity, Innovation and Problem Solving was such an initiative by Dr. Anil Patel at Charotar University of Science and Technology, Gujarat, India. The introduction of a course on creativity in the university curriculum has significantly fostered entrepreneurial spirit among the students. It provided students the knowledge, mindset, and techniques essential to generate unique ideas, solve complex problems, work as a team, and

Table-7: Overall Analysis of Student Feedback Considering Statement 1-15

	Year	**2017-18**		**2018-19**		**2019-20**		**2020-21**		**2021-22**	
	No. of Students	**1141**		**1367**		**1640**		**1923**		**2027**	
	Statements	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Overall	1-15	4.28	0.8	4.34	0.8	4.44	0.57	4.47	0.56	4.49	0.54

exhibit creativity, which empowered them to think outside the box to build the skills required to succeed in a constantly changing business world. Since 2017, in the last six years, in total, 10843 students of the professional programmes of the university have successfully attended the course and contributed to the nation-building.

Major Findings

Major findings that could potentially be derived through a research study on the effectiveness of the course are as follows:

- Students hone their creativity, problem-solving, and innovative thinking skills.
- Students found that individual and group activities were more engaging and stimulating, which enhanced their motivation to participate in the course.
- Participation in individual and group activities has helped students become better communicators and team players.
- The course helped students to comprehend the complex concepts and come up with creative solutions across a range of subject areas, which will be beneficial to them in solving complex problems in the future.
- The course helped students to be comfortable in sharing creative ideas and solutions with each other. Being able to communicate and present innovative concepts made them feel more confident.
- Students may be able to apply their capacity for creative thought to various facets of their academic and social lives, promoting a more all-encompassing development.
- Teachers who taught the course adopted more exploratory and student-centric teaching strategies in their regular classrooms.
- According to the research study, students who took creativity sessions acquired creative thinking skills, which would help them during decision-making and problem-solving at their workplaces.

Conclusion

The activity and methodology used in the current case study are unique and novel. In order to develop undergraduate students' creativity, a course on creativity, problem solving, and innovation suggests innovative concepts and efficient methods for enhancing students' learning ability. As a result, the study supports the effectiveness of CPI courses in fostering the development of abilities like creativity, critical thought, decision-making, problem-solving, etc. The case study demonstrates how creativity may be effectively developed through the use of need-based pedagogy, cutting-edge materials, and well-defined teaching methods. The study recommends the implementation of the CPI course in colleges and universities in India since it will result in the creation of skilled young Indian contributors.

Additional future parts related to these two papers will provide the impact of the course on students' creativity and entrepreneurship.

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Navigating the Copyright Crossroads: Libraries and Intellectual Property in the Digital Age

G Ramadas*

Libraries are at a juncture where traditional ideals of access, preservation, and dissemination of knowledge meet increasingly complex copyright and licensing landscapes. In the face of rapid digital transformation driven by open science movements, big data analytics, artificial intelligence, cloud computing, mass digitisation, and global research collaborations, libraries experience unprecedented challenges related to the management of intellectual property rights. The paper discusses the changing copyright landscape of libraries from legal, technological, and ethical perspectives, in light of the provision of equitable access while respecting creators' rights. Issues covered are rights management for digital and born-digital resources, text and data mining, licensing versus ownership models, orphan works, mass digitisation, fair use and fair dealing across jurisdictions, digital preservation, AI-generated content, and cross-border enforcement. Based on international best practices, this paper also identifies actionable strategies and policy recommendations that would position libraries as proactive stewards of knowledge and advocates of balanced copyright reform.

Libraries have always been more than repositories---they are living infrastructures of knowledge creation, access, and cultural memory. In the analogue era, copyright frameworks provided relatively clear boundaries around library use: lending, photocopying, and preservation were governed by national statutes with predictable limits. In the digital age, however, these boundaries have blurred. Content flows instantly across borders; research increasingly relies on machine-readable datasets; and commercial licensing frequently displaces ownership, restricting libraries' ability to lend, archive, or adapt materials. Meanwhile, AI consumes unprecedented volumes of library-sourced content for model training, raising new questions about rights, reuse, and attribution.

This paper explores how libraries can navigate that copyright crossroads, where technological innovation both amplifies opportunities and complicates obligations. It identifies the main emerging IPR challenges defining the digital era, analyses the legal and technical drivers behind them, and proposes a roadmap for how libraries can safeguard their public mission while remaining compliant with intellectual property law. Key emerging challenges at the Copyright Crossroads are provided in Table 1.

Licensing Supplanting Ownership

In the digital era, libraries are increasingly licensing, not buying, resources, which turns upside down their traditional relationship with content. Unlike physical books, which can be lent freely to patrons, stored in archives, or migrated among formats, licensed digital content often carries significant use, copying, and sharing restrictions. That upends the long-standing first-sale doctrine, thereby circumscribing interlibrary lending programs and limiting libraries' abilities to guarantee long-term access. Preservation efforts are also complicated by licenses that restrict archival storage or format migrations, raising questions about the long-term usability of digital collections. With that, libraries find themselves having to adapt to new circumstances in which legal permission, rather than ownership itself, determines the extent of their ability to pursue their public service missions.

Orphan Works and Mass Digitisation

A substantial part of library collections cannot be made digitally accessible due to the inability to find the rights holders, which are then labelled "orphan works". The absence of harmonised national rules concerning orphan works remains one of the main barriers to mass-scale digitisation. This places libraries in a kind of legal limbo. Although jurisdictions such as the European Union have drafted guidelines that permit controlled digital access under a diligent search, no such consensus exists elsewhere. Besides delaying the effective spread of information, this fragmentation also blocks libraries from fulfilling their public commitment to universal access and locks away valuable cultural and scholarly content.

Text and Data Mining (TDM) Uncertainty

Modern scholarship increasingly depends on large-scale text and data mining to extract

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**Deputy Librarian, Noorul Islam Centre for Higher Education, Kumaracoil - 629 180, Kanyakumari, Tamil Nadu.*

Table 1: Key Emerging Challenges at the Copyright Crossroads

Challenge	Description	International Example
Licensing over Ownership	Shift from purchase to license-based access restricts long-term use, interlibrary loans, and preservation.	Academic libraries are subscribing to "big deals" from commercial publishers.
Text and Data Mining (TDM)	Computational research on licensed or copyrighted works is legally ambiguous.	EU DSM Directive (2019) provides a TDM exception; other regions lack clarity.
Digital Preservation & Orphan Works	Unclear rights for digitising or archiving works whose rights-holders cannot be traced.	European a's Orphan Works Database in the EU.
AI-Generated Content	Questions over copyright ownership and training data used by AI systems.	The U.S. Copyright Office is rejecting AI-only works for copyright registration.
Cross-Border Access	National copyright laws limit sharing and interlibrary lending internationally.	WIPO Marrakesh Treaty for accessible format copies.

patterns, insights, and trends from large corpora of scholarly articles, books, and datasets. However, the permissibility of TDM is highly variable depending on licensing agreements and national copyright laws. Non-consumptive uses may be permitted under fair use or fair dealing provisions in some countries, but others prohibit machine analysis in the absence of explicit consent. These inconsistencies create friction for both researchers and librarians as they strive to facilitate advanced computational scholarship, thereby slowing the pace of innovation and complicating cross-border research collaboration.

AI Training and Copyrighted Content

The rapid rise of artificial intelligence has brought new complications to libraries, as AI models are increasingly dependent upon digitised works for training. Questions remain unresolved regarding the copyright status of training data, derivative outputs, and AI-generated content. Libraries providing large-scale digital collections face potential liability for the works they host should those works become part of an AI model without authorisation. It follows that this is a legislative grey area that exposes institutions to compliance risks while simultaneously illustrating the transformative role of libraries in the emerging AI-driven knowledge ecosystem.

Digital Rights Management (DRM) and Technical Barriers

Technological Protection Measures (TPMs), more commonly referred to as Digital Rights Management, add yet another layer of barriers to libraries in carrying out legitimate functions. Such activities that might be prohibited by DRM restrictions include the conversion of works to accessible formats on behalf of visually impaired users, making preservation copies, or migrating content to new platforms. Circumventing TPMs for such lawful purposes may violate anti-circumvention laws unless explicit legal exemptions are provided, placing a library in the invidious position whereby essential elements of its public service role are limited by technology, rather than copyright law alone.

Cross-Border Copyright Conflicts

The inherently global nature of digital libraries clashes with nationally bounded copyright laws. Libraries that serve international scholars have to deal with a patchwork of rules concerning fair use or fair dealing, database rights, and TPM circumvention. For example, a practice that is considered permissible under US fair use law may be illegal under EU copyright directives. This creates operational complexity for institutions that provide digital access to a worldwide audience, necessitating careful compliance strategies and limiting the potential for truly global knowledge sharing.

Intersections of Privacy and Rights

Digitisation and AI-driven metadata can sometimes reveal personal or sensitive information inadvertently. Libraries need to balance obligations under data protection laws with commitments toward open access and scholarly transparency. For instance, user-generated metadata or AI-curated annotations may be integrated into the resource and expose identifiable data without consent. The many overlapping concerns make a case for policies that protect privacy while enabling responsible access to digitised and AI-enhanced resources.

Comparative Perspectives: The Global Patchwork

The legal and regulatory environment in which libraries operate is very heterogeneous around the world, with a complex "patchwork" of regulations that are challenging for institutions to navigate in the digital era. In the United States, the doctrine of fair use enables libraries to pursue projects involving digitisation, text and data mining, and transformative research by providing a broad and flexible framework for such initiatives. This flexibility, however, is mitigated by the wide use of contracts containing restrictive terms and DRM technologies that interfere with statutory rights, significantly undermining practical access. As such, even in countries at the vanguard of applying fair use, there are difficult operational limits on the extent to which libraries can maximise access in the digital arena. The copyright regime in the European Union is more prescriptive, rooted in principles of fair dealing with specified exceptions.

Sui generis database rights further complicate access to large-scale datasets and TDM projects beyond the standard considerations of copyright; indeed, separate permissions may well be needed. Recent EU directives, such as the exception for text and data mining for research purposes, represent an important step toward reconciliation of these restrictions, but the overall system remains intricate and highly regulated. Libraries need to navigate both copyright and database rights with great care, often involving consulting lawyers and taking into account possible risks before a digitisation or analytical project is initiated.

Across the Asia-Pacific and the broader Global South, rapid growth in digital infrastructure and collections occurs against uneven and often underdeveloped legal frameworks. Libraries in these regions thus face a dual challenge of implementing global practices for digital curation while working within incomplete or inconsistent copyright legislation. The cross-border licensing challenges already daunting in North America and Europe are exacerbated by resource constraints, serving to limit library access or full participation in international collaborations. Strategic Responses for Libraries at the Crossroads are provided in Table 2.

Case Studies at the Crossroads: Intellectual Property and Access to Knowledge

Europeana and Orphan Works (European Union)

Europeana is the leading digital platform for cultural heritage, collecting metadata and digital objects from libraries, archives, and museums across the European Union. It has the broad mission of providing access to pan-European content for research, education, and public purposes. One of the most significant challenges faced by Europeana is the orphan works problem: copyrighted works where the rights-holder cannot be identified or located. Before the EU's recent regulatory intervention, such works were effectively unavailable for digitisation, since using them without permission entailed serious legal risk.

To address this challenge, there was the introduction of the Directive 2012/28/EU on

Table 2: Strategic Responses for Libraries at the Crossroads

IPR Challenge	Strategic Response	Potential Benefits
Licensing Restrictions	Negotiate licenses that include archiving and interlibrary loan clauses.	Sustainable access & preservation.
TDM Rights Uncertainty	Develop internal TDM policies and use secure research environments.	Encourages computational research.
Orphan Works	Establish risk-management frameworks and rely on collective licensing schemes.	Enables large-scale digitization.
AI Content Issues	Track provenance of training data and create usage policies for AI-generated outputs.	Mitigates legal risk & ethical concerns.
Cross-Border Limitations	Collaborate through consortia, leverage WIPO treaties, and develop cross-border lending protocols.	Greater global knowledge sharing.

Orphan Works was introduced. The directive allows libraries, museums, and other cultural institutions in member states to digitise and publicly display orphan works after a "diligent search" for the rights-holder has been conducted. Key features include the establishment of a centralised orphan works registry, rigid limitations on commercial exploitation, and legal protection if a rights-holder emerges later. Taking advantage of this directive, Europeana has been able to unlock large-scale digitisation of orphan works, enabling wider public access and facilitating scholarly research across multiple jurisdictions. This case underlines how a harmonised legal framework is able to balance copyright protection with the need for cultural accessibility and may therefore be a model for the many transnational digital heritage projects.

HathiTrust Digital Library (United States)

HathiTrust is a collaborative endeavour by the major US research institutions to build a digital repository of millions of books, mainly digitised through its partnerships with Google Books and institutional digitisation efforts. Apart from its preservation, another key focus for HathiTrust has been TDM, as it enables researchers to analyse large corpora in ways they could never do before. However, the scale of its digitisation activities also meant that it attracted significant legal attention. In the seminal case Authors Guild v. HathiTrust (2012), the Authors Guild objected to the mass digitisation of copyrighted works, even for non-consumptive uses like search and data analysis, because it violated copyright. The court ruled in favour of HathiTrust, applying the fair use doctrine. The judgment emphasised that HathiTrust's activities were transformative, digitised copies were used for research, search, and accessibility, not as substitutes for originals. Furthermore, the access provided was non-commercial, limited, and served the broader public interest. The HathiTrust case illustrates the tension between copyright protection and knowledge democratisation in the United States. Whereas fair use allows flexibility for digital libraries, restrictive licenses and DRM technologies continue to cabin broader access. It also illustrates the legal precocity that institutions pursuing large-scale digitisation and advanced research services have been confronted with, underlining the need for appropriate risk assessment and policy planning.

Indian Copyright Act Amendments (2012)

In 2012, India introduced comprehensive amendments to its Copyright Act, which essentially reflected the rapidly growing digital knowledge economy and the imperative to include broad-based access to information. The revisions broadened the scope of fair dealing by clearly permitting activities for education, research, criticism, review, and reporting. Crucially, these provisions extend both to digital uses and online uses, allowing libraries, universities, and research organisations to make use of copyrighted materials without infringing, provided the use is non-commercial, and the source is acknowledged. Another major reform concerned accessibility by persons with disabilities. The revisions granted educational institutions the right to reproduce and distribute works in accessible formats such as Braille or audiobooks, empowering visually impaired and differently-abled users to participate fully in the educational ecosystem. The amendments also provided for compulsory licensing and flexible exceptions to enable non-commercial uses in specific education and research contexts. These changes mark a fundamental paradigm shift in India's copyright policy towards social equity, dissemination of knowledge, and the public interest. By directly addressing the needs of educational institutions, researchers, and marginalised users, the 2012 amendments foreshadow a perspective that is attuned to matching legal frameworks with technological and social realities. Compared with Europe and the United States, India has placed greater emphasis on inclusiveness and access, in line with Global South imperatives to promote knowledge-sharing and educational equity.

Implications Across Case Studies

These case studies together demonstrate the varied ways in which legal frameworks shape digital access to knowledge. Comparative Insights and Crossroads Analysis are given in Table 3. Europeana illustrates how coordinated EU directives can facilitate cross-border cultural digitisation, HathiTrust represents the transformative possibilities of fair use in research-intensive environments, and the amendments within India undergird inclusive copyright reform in order to achieve equitable access. Together, they show the tensions and opportunities at the crossroads of copyright, digital libraries, and public access, and provide key lessons for policymakers, librarians, and scholars navigating the complex landscape of intellectual property in the digital era.

Table 3: Comparative Insights and Crossroads Analysis

Aspect	Europeana (EU)	HathiTrust (USA)	Indian Copyright Amendments (2012)
Primary Focus	Mass digitisation of orphan works	TDM and preservation of books	Inclusive access and educational use
Legal Mechanism	EU Orphan Works Directive	Fair use doctrine	Fair dealing & accessibility exceptions
Scope	Cultural heritage, non-commercial	Research, non-consumptive use	Education, research, disability access
Challenge Addressed	Missing rights-holders	Litigation risk for mass digitization	Ensuring inclusivity and digital equity
Outcome/Impact	Centralised digitisation platform, public access	Legal precedent for transformative use	Broader access for students and persons with disabilities

Key Takeaways

- ***Legal Frameworks Shape Access*****:** Both the EU and India have adopted specific legal tools to enable libraries and institutions to digitise content while mitigating copyright risk.
- ***Balancing Act:*** The US case highlights the tension between copyright protection and public interest in transformative uses like TDM.
- ***Global South Perspective*****:** India's approach emphasises social equity and accessibility, showing that copyright law can be leveraged to promote inclusive knowledge ecosystems.
- ***Strategic Lessons for Libraries*****:** Institutions worldwide must navigate legal uncertainty, technological challenges, and social imperatives when pursuing mass digitisation and open access projects.

Special Focus: AI, Training Data, and Libraries

The rapid integration of artificial intelligence into research and public services has brought about a complex set of challenges and responsibilities for libraries, particularly in terms of the use of training data. A fundamental concern regards provenance and record-keeping: libraries have to capture metadata with full information about the source, licensing terms, and any data transformation applied to the datasets used for AI model training. Proper record-keeping ensures transparency and facilitates accountability, permitting an institution to answer for any legal or ethical inquiries. Closely associated with provenance are questions of license clarity. Libraries should seek explicit permissions for using copyrighted works in training AI or prioritise openly licensed datasets. Ambiguities in licensing create specific infringement risks where the use involves vendors or commercial models. Apart from purely legal adherence, ethical consideration for AI initiatives is another challenge for libraries. This includes the review of potential privacy issues, identification of bias within the dataset, and assessment of possible harm that AI-generated outputs may create in individuals or communities. Ethical oversight ensures alignment of AI integration with both societal values and professional library standards.

Another critical consideration is risk management. Prior to releasing large corpora to external vendors for model training, libraries should assess both legal and reputational risks, including potential misuse of data or unintended sensitive content exposure. Strong risk assessment protocols provide an opportunity to protect the institution's reputation and reduce its liability. Last but not least, libraries have a key role to play in supporting reproducibility and transparency in AI research by making machine-readable, open formats and complete metadata available. These practices allow researchers to verify findings, reuse data in a responsible manner, and build a more trusted and transparent AI ecosystem. In conclusion, the intersection of AI and library science requires attention to rights, ethics, and strategy. Libraries adopting meticulous tracking of provenance, clear licensing, ethical oversight, and reproducibility measures will be able to navigate challenges in AI while continuing to realise their mission of equitable and sustainable knowledge access.

Policy Recommendations: Pathways for Balanced Reform

Addressing the complex challenges faced by libraries in the digital era requires a multi-pronged approach that balances the rights of creators with the public interest in access to knowledge. Among the critical recommendations, there is a need for non-overridable exceptions for activities like text and data mining, preservation, and accessibility. By safeguarding these core library functions against contractual limitations or restrictive licenses, institutions ensure that essential research and preservation activities continue unhindered. In areas dealing with orphan works, policy frameworks should combine diligent search requirements with collective licensing mechanisms, enabling libraries to digitise and disseminate orphaned content in a legally certain way. This allows cultural heritage institutions to unlock historically significant works while avoiding the potential for liability. Similarly, transparency obligations about AI training datasets are key: Libraries should document the provenance, licensing, and processing applied to the data, thereby ensuring accountability and facilitating ethical oversight into AI research and model development.

Modernised legal deposit laws are also necessary, enabling libraries to capture, preserve, and provide access to digital content, including cross-border dissemination, in ways that meet the realities of the digital knowledge ecosystem. Complementing this, accessibility carve-outs should allow lawful circumvention of Technological Protection Measures (TPMs), thereby allowing visually impaired or differently-abled users to access such content without legal or technological barriers. Policies should also impose limitations on contractual override of statutory exceptions, in particular that license agreements may not extinguish essential rights, such as those of preservation, lending, or research use. Finally, addressing these challenges requires deeper international collaboration through institutions like the World Intellectual Property Organisation (WIPO) and regional copyright frameworks. In this direction, a harmonisation of rules concerning TDM, orphan works, AI use, and cross-border digital access would position libraries to work better in the context of a globally interconnected knowledge environment. These policy pathways, taken together, underscore flexibility, transparency, and equity in developing a legal and operational ecosystem within which libraries can fulfill their mission of providing inclusive, sustainable, and legally compliant access to knowledge.

Governance, Ethics, and the Future Role of Libraries

In this light, robust governance structures become particularly important in a landscape where copyright, digital access, and AI-driven innovation are increasingly complex. A key recommendation is that each library establish a rights governance board responsible for overseeing the use of copyrighted materials, digital licenses, and large-scale datasets. Such boards can advise on compliance, risk management, and strategic decision-making to help institutions strike a balance between legal obligations and the mission of open access. Libraries should establish ethics committees to review AI projects for potential bias, privacy implications, and larger societal impacts. Such committees can ensure that AI-driven services, metadata enrichment, and predictive analytics are deployed in the service of fairness, transparency, and the values of the communities they serve. Finally, governance and ethical review should be complemented by making rights metadata and the rationale underlying policy decisions publicly transparent. Documenting the provenance of datasets, licensing terms, and the rationale for policy decisions creates accountability and can foster trust among researchers, users, and creators alike.

Another crucial element for the future of library governance is community engagement. Libraries will have to actively consult with and involve stakeholders-students, researchers, and marginalised communities ensure alignment with societal values and needs. This participatory approach not only strengthens the relevance of library services but also reinforces public trust in institutional decision-making. Eventually, libraries combining legal acumen and technical capability with ethical and policy engagement will be best positioned to navigate the evolving digital knowledge ecosystem. The institutions can protect and expand access to information, support equitable scholarship, and responsibly leverage emerging technologies, all while respecting creators' rights and contributing to a sustainable, inclusive information society.

Actionable Checklist for Libraries

To help libraries navigate this complex environment of digital copyright, AI, and access to knowledge, what is required are practical, actionable steps that bring together legal, technical, and ethical considerations. First among priorities will be the need to inventory digital holdings and comprehensively map rights metadata. By understanding which works are licensed, orphaned, or restricted, libraries can make informed decisions about access, preservation, and reuse. Identifying at-risk materials such as licensed-only, DRM-protected, or orphaned content will support prioritising resources and planning interventions to avert loss of access longitudinally. Preservation planning should cover escrow clauses, format migration, and backup protocols that ensure digital collections remain usable and secure long into the future. Licenses should be negotiated with explicit permission given for activities such as TDM, preservation, and accessibility, reducing ambiguity and protecting key scholarly and public services. Adoption of standardised rights statements promotes efficiencies in user understanding and aligns how digital resources are managed and shared.

Libraries should establish trusted research environments for computational research by providing secure, controlled spaces where large-scale data analysis can take place without violating copyright or privacy obligations. Meanwhile, continuous training of staff and users in intellectual property rights, licensing, and the ethical use of AI tools will help build institutional capacity to manage new emerging challenges responsibly. Libraries should also be actively involved in consultations about policy at the national or international level to advocate for copyright frameworks that are fair, inclusive, and forward-looking. Such collaboration, through consortia or networks, improves bargaining power when negotiating licenses and strengthens collective solutions for shared problems. By documenting all rights clearance efforts and decision-making processes, transparency, accountability, and reproducibility are enhanced, allowing users, creators, and regulators to verify and trust a library's actions. This checklist helps libraries follow a systematic path on safeguarding access, maintaining legal and ethical standards, and reinforcing their role as indispensable stewards of knowledge in the digital era (Figure 1).

Fig 1: Conceptual Framework for Library IPR Risk Management

Conclusion

While intellectual property rights remain necessary to encourage creation, too inflexible or outdated protections hinder libraries' ability to preserve culture, enable education, and facilitate modern research. The Internet era calls for flexible, transparent, and public-interest-sustaining strategies for IPR. By embedding rights-awareness in all aspects of acquisition, preservation, and access, negotiating with vendors assertively, investing in secure digital infrastructures, and advocating for balanced global reforms, copyright challenges become leadership opportunities. Libraries also fulfil their foundational role as caretakers of the intellectual commons: instead of merely managing the copyright crossroads, they are charting an unequivocal path -- an ethical path into the future---that generations of researchers and learners can follow.

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Exploring the Pedagogical Potential of Artificial Intelligence, Augmented Reality and Virtual Reality to Enhance Teaching and Learning Practice

Preeti Malik* and Amit Gautam**

As education increasingly operates within a technology-mediated environment, sustained pedagogical adaptation has become imperative. Shifts in instructional practices, learning processes, and classroom interactions necessitate a critical examination of emerging educational technologies. This paper explores the pedagogical potential of Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR) in teaching and learning contexts, with a focus on their educational implications rather than technical complexities. Drawing on existing literature and selected practices from India and global contexts, the study examines how these technologies can enhance learner engagement, support differentiated instruction, and facilitate personalised learning. It argues that the thoughtful and context-sensitive integration of AI, AR, and VR—whether gradual or direct—can contribute to addressing diverse learner needs and reducing educational disparities. At the same time, the paper acknowledges the challenges associated with adopting these technologies, including infrastructural constraints, pedagogical readiness, and institutional capacity. The study identifies key impediments to effective integration and proposes strategic measures to address them. It concludes by offering policy-relevant recommendations for educators, administrators, and policymakers to strengthen pedagogical practices and advance a future-ready education system.

Technological innovations are gripping our society with their invaluable features. The technology dependence is ubiquitous across all ages, be it the paediatric population, adolescents, young adults or even the middle-aged adults or senior citizens and has woven its way into the fabric of everyone's life with its interconnected nature, making everyone rely upon it, in one way or the other. This pervasive presence of technology underscores its importance in education. Pedagogy, being the main core element that encompasses the whole classroom transaction, is the vital source of illuminating the minds of learners with its wide range of abilities to make learning easy and understandable. It is a multifaceted concept that involves dynamic interactions between teachers, students and learning environments and technologies like Artificial Intelligence (AI), Virtual Intelligence (VI), and Augmented Reality (AR) hold immense pedagogical potential and can revolutionise the educational framework, traditional teaching methodologies, learning styles, instructional strategies, and pedagogical approaches. The rapid advancement of technologies is reshaping the educational practices, demanding more adaptive, immersive and learner-centred approaches as AI have the potential of bringing positive disruption to the education system by offering personalised learning experiences, and real-time feedback as well as support to the students. It also supports teachers and assists them in tracking the personal needs of the learners so as to tailor lessons according to their specific needs (UNESCO, 2022).

In addition, AR, an interdisciplinary framework, has the potential of integrating both real and virtual objects into a real situation, with an objective of achieving four features like attention, relevance, confidence, and satisfaction with the ability of motivating its users (Dargan, et al., 2023). On the other hand, VR relies on 3D computer-generated settings, enhanced by display systems, in order to deliver multi-sensory, interactive experiences centred around the viewer or the user. These technologies have the potential of creating an engaging and interactive learning environment, and this synergy helps to boost students' motivation and interest in learning, making complex subjects more transparent, approachable and enjoyable (Al Balushi et al., 2024). Hence, these technologies provide a platform that is capable of personalising and enhancing the educational journey.

Beyond motivation and engagement, the integration of emerging technologies resonates with foundational theories, like experiential learning theory, constructivist learning theory and Vygotsky's

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**Research Scholar, National Institute of Educational Planning & Administration, New Delhi, E-mail: preetimalik@niepa.ac.in*
***Associate Professor, National Institute of Educational Planning & Administration, New Delhi. E-mail: amitgautam@niepa.ac.in*

concept of scaffolding, rooted in socio-cultural theory. According to Kolb (1984), concrete experience, reflective observation, abstract conceptualisation and active experimentation make learning easy. The experiential learning theory suggests that learning occurs through direct experience & reflection. AI, AR, as well as VR provide immersive and simulative environments, making abstract thinking possible, allowing its learners to interact with the virtual objects in a virtual environment, enabling them to reflect on their experiences, understand the real-world situations and learn from them. The constructivist learning theory also suggests that learners has the ability of constructing their knowledge as well as understanding as per their construction of thoughts through active engagement with the environment via assimilation and accommodation of their knowledge with the new information (Piaget, 1954) and these emerging technologies can support constructivist learning by providing interactive, dynamic learning environment so as to explore new information and concepts and discover novel findings by interacting in simulative environments to construct their own understandings. The concept of guided learning, deeply rooted in Vygotsky's zone of proximal development, suggests every student has a different learning style and ability to learn, and therefore needs certain help to enhance their learning (Vygotsky,1978; Wood, Bruner and Ross,1976). And the use of intelligent and immersive technologies mirrors the process of scaffolding, wherein learners are supported through certain tasks that lie beyond their capabilities and make learning easy.

Pedagogical Potential of AR, VR and AI

The holistic set-up of education caters to the needs of diverse learners, and reflective pedagogy plays a critical role in addressing the diversity by encouraging thoughtful alignment of teaching methods (Fernandez et. al., 2024). This reflective practice motivates the educators to assess their teaching methods regularly, and in this evolving landscape of education, upgrading oneself is vital to match the pace of the changing world. Hence, living in this technology-driven era makes it very important to incorporate the same in the teaching and learning process, and this upgrade should be reflected in the teaching styles and practices of educators. Therefore, understanding the pedagogical potential of new age technology like AI, AR & VR is way more important than it seems.

The strategic integration of technology in pedagogical practices can enhance student-centred and personalised learning, along with high student engagement. (Davlataliyevna,2024) (Bowman, 2024). One of the vital components of SDG, i.e., equitable quality education for all, could be achieved by this integration in the teaching and learning system. AI has the potential to transform the education system as its human-centred application can help the stakeholders to achieve the long-desired goals of education. National Education Policy (NEP) 2020 also emphasises the integration of education so as to develop a digitally empowered society and a knowledge-based economy. The NEP--2020 highlights the bidirectional relationship between technology and education and encourages the use of advanced technologies like AI, AR & VR. The new age learners need a well-defined structure that is particularly tailored according to their personalised needs, and these technologies create a more engaging and impactful learning environment and could be applied in various fields like STEM, medicine, language, acquisition and the development of interpersonal skills. Also, it improves student motivation, memory retention, and comprehension of complex subjects (Al Balushi et al., 2024). Augmented reality is one such tool that, when applied to education, can enhance learning experiences by creating an immersive and interactive stage for student engagement and better understanding of concepts, as it bridges the gap between the real and virtual worlds, leading to more student participation and comprehension, making learning more contextual and relevant (Shihab et al., 2023). It is therefore important to polish the current pedagogical practices.

Application and Classroom Integration

AI, a term coined by John McCarthy, is basically the ability of a system to correctly interpret the external data, in order to understand it and use this understanding and learnings to achieve specific goals and tasks through flexible adaptation (Kaplan and Haenlein, 2019). AI in education holds significant potential to revolutionise the education sector by enhancing personalised learning experiences, improving access to quality education, and providing robust guidance to educators to make the teaching and learning process attractive (NITI Aayog, 2018). AI-driven pedagogy follows adaptive learning pathways that cater to the individual needs of the learners, fostering a deeper understanding and promoting inclusivity that empowers the goal of equity (Kaldaras et al., 2024). It not only enhances learning experiences by tailoring educational content but also provides real-time feedback as well as guidance to ensure better learning outcomes (Kumar et al., 2023). Intelligent tutoring systems enhance personalised learner support, and when combined with teacher expertise, AI can significantly enhance teaching–learning processes (El Boujnani, et al., 2024). By automating routine administrative tasks, AI allows educators to focus more on instruction and classroom interaction, thereby improving learning experiences and outcomes (Starodubtsev & Neradovskaya, 2024; Bonde, 2024).

AR, a platform designed for offering learning materials, such as interactive textbooks, 3D models and virtual labs, provides an immersive experience, creating a more engaging and interactive environment (Dargan et al., 2022). It provides contextual learning experiences to the learners by bridging the gap between theoretical and real-world knowledge. As in the case of STEM, students have to rely on abstract thinking ability and at times it becomes difficult to understand the profound concepts. In such a context, AR-enhanced pedagogy would provide interactive 3D models of atoms, molecules, cells or different machines (Wu et al, 2013). Freitas & Neumann (2009) highlighted the nature of AR-powered virtual labs and showcased their capability of allowing students to conduct experiments and investigations in a safe and controlled environment. Moreover, it can showcase and visualise mathematical concepts, such as geometry as well as algebra, making the concepts more engaging and comprehensible (Kaufmann & Schmalsteig, 2003). It is noticed that art integration in the augmented reality experiences makes the mathematical concepts more interesting, and students can comprehend them easily. (Voulgari, Panagopoulous, & Garnelli, 2024). Shihab et al., (2023) describe AR as a revolutionary tool that has the ability to reshape the conventional learning paradigms by its ability to render immersive and interactive learning experiences. Poetry, literature and literacy can also be made more interesting for the students as AR-powered pedagogy can provide better options to learn. AR-powered storytelling can bring books to life, allowing the learners to interact with characters and environments (Sanmugam, Barkhaya, 2024). It can also provide immersive language learning experiences (Kavaklı et al., 2024), such as virtual conversations as well as interactive & engaging vocabulary exercises for enhanced language learning (Karacan & Akoğlu, 2021). Historical events and environments could be recreated for better understanding, allowing students to explore and interact with the past. Also, it can transport the students to the past and provide AR-powered virtual trips to museums and more immersive learning experiences (Dunleavy & Dede, 2014; Akçayır & Akçayır, 2017).

In contemporary education, AR is increasingly recognised as a valuable tool as it overlays the digital information onto the real world and allows the learners to interact with the content in a more meaningful way, which helps in making the abstract concepts more observable and comprehensible and would ultimately provide better learning outcomes (Starodubtsev & Neradovskaya, 2024).

On the other hand, VR can transform the traditional education system by providing simulative, interactive, personalised and collaborative learning experiences that cater to diverse learners' needs, and foster inclusivity and engagement. VR can be used as a powerful pedagogical tool by effectively integrating into various teaching and learning practices to explore complex subjects like history, science, or other subjects in a more captivating manner (Chalkiadakis et al., 2024). VR provides students with access to remote and inaccessible resources by facilitating these resources in a virtual environment and helps them to understand and appreciate the abstract concepts (Al Balushi et al., 2024). MetaKalvi, a VR-based education program initiated by the Tamil Nadu government, has been introduced to enhance STEM education through immersive technology. Though it is facing a few challenges, it is a great initiative towards exploring the pedagogical potential of virtual reality.

Unlike traditional classroom settings that often face limitations in providing adequate resources and realistic environments, VR offers immersive and interactive simulations that can closely mimic real-world scenarios, making it suitable for teaching complex skills that require hands-on practice. The effectiveness of VR pedagogy lies in its experiential nature, which supports active engagement, immediate feedback and learning through exploration. To guide the systematic amalgamation of VR in education, the Virtual Reality Instructional Design (VRID) model proposed by Chen (2009), offers an inclusive framework that is suitable for designing and developing educational virtual environments and virtual reality-based instructional experiences, creating education more engaging and effective (Chen, 2009).

Moreover, attaining certain skills like working in a science laboratory requires access to controlled, risk-free, and resource-intensive environments, something that VR can only provide with great precision. VR provides reality emulations that are close to reality, thereby supporting deeper learning (Dargan et al., 2022). For instance, VR can simulate laboratory experiments, hazardous chemical reactions, or surgical procedures, allowing students to practice safely and repeatedly without any barrier in a safe environment. Also, other research suggests that these technologies help in developing new competencies among children, which not only include technical skills related to AR and VR but also soft skills like creativity and teamwork. Furthermore, it enhances motivation for independent learning, activates educational activity, provides positive motivation for personal and professional growth among the students, and develops personal qualities like creativity and teamwork (Zheleva, 2024).

Effectiveness of integrating AI, AR and VR powered Pedagogy

Integrating AI with immersive technologies like AR and VR significantly enhances educational outcomes, as students can explore complex ideas within engaging, interactive and visually captivating settings, which can make the learning more thought-provoking and inspiring (Kaldaras et al., 2024). Also, various studies show increased student motivation, better memory retention and improved comprehension of complex subjects (Al Balushi et al., 2024, Starodubtsev & Neradovskaya, 2024). The wise use of these technologies has been noticed throughout the globe, like the Beijing Normal University (China), which is using AI and VR for providing immersive learning experiences to its learners, and the University of Oxford (UK) integrates AI in providing personalised learning platforms and also uses VR for historical and archaeological explorations. Stanford's Virtual Human Interaction Lab and courses like “Virtual People” use Virtual reality concepts for a better understanding of concepts and similarly, Woxsen University in Hyderabad is at the forefront of integrating these technologies into its curriculum as well as research initiatives. It is using an AI-driven neuroadaptive interface in order to track the cognitive and behavioural outcomes in real time for providing personalised learning to the students. These initiatives are a step towards exploring the pedagogical potential of these emerging technologies. These technologies are helpful in creating a holistic, immersive learning environment, by improving the educational accessibility, personalisation, social inclusion, better learning opportunities, inclusion for students with disabilities in making learning experience more vivid, experiential and tailored to individual needs (Chalkiadakis et al., 2024; Kumar et al., 2024). Furthermore, Kavaklı et al., (2024) infer that these technologies not only significantly enhance the learning experiences of language learners but also cater to the learning styles of the learners, making the lessons more engaging and interesting for all the students. The integration of AI, AR & VR in educational settings not only enhances student engagement and interest but also contributes to the development of essential skills and personal qualities, making this innovative approach more dynamic and effective (Zheleva, 2024).

These technologies have high potential, and when the same is applied in education, it makes teaching and learning more convenient, easy and comprehensible. The pedagogical aspect of AI, AR & VR supports constructivist learning through active knowledge construction, provides cognitive scaffolding via adaptive guidance, and experiential learning through immersive and interactive environments. This has been depicted in Figure 1, where the convergence of AI, AR, & VR in education is shown, highlighting their meaningful integration for fostering constructivist learning, enabling scaffolding through personalised support and promoting experiential learning. Moreover, López, et al., (2024), emphasise the amalgamation of AI, AR &VR technologies for educational practices and perceive their synergy as Triad of Visual Digital Innovation (TVDI). This is seen as a transforming tool in education, in enhancing educational experiences, captivating students’ interest, leading to increased motivation, immersion and even international collaborations among students as well as educators. It has been asserted that AR & VR have the potential of providing students with the opportunities to visualise complicated concepts easily, which was not possible in the older days with traditional methods of teaching and learning (Fitria, 2023). Also, the strategic amalgamation of virtual reality (VR), augmented reality (AR) and Artificial Intelligence (AI) has demonstrated a profound potential in elevating academic achievement, captivating students’ interest and fortifying comprehension (Kaldaras et al., 2024).

Fig—1: Pedagogical Integration of AI, AR & VR in Education

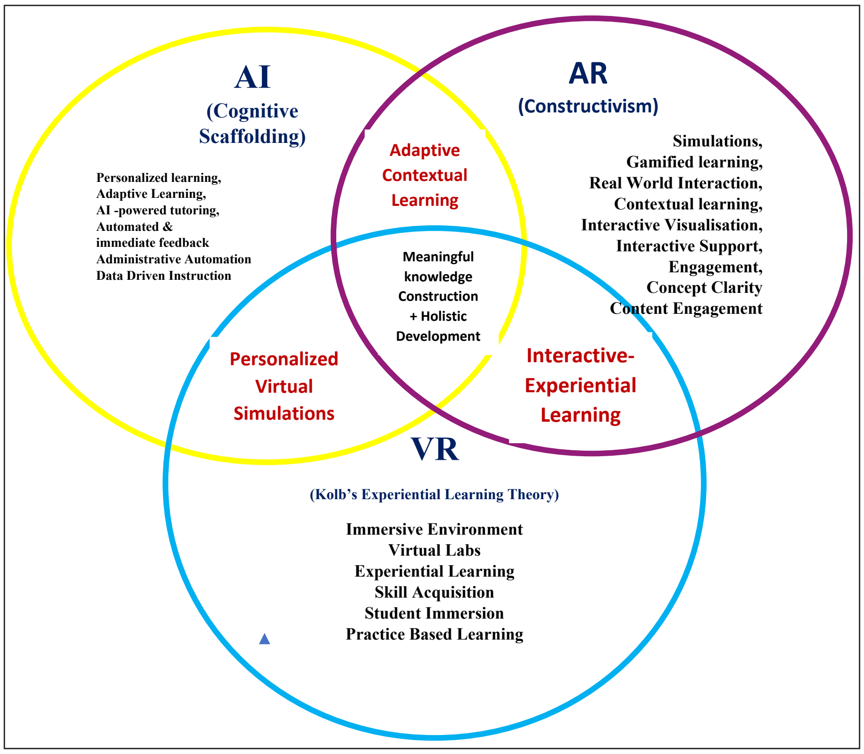

Figure 1 - Depicting Venn Diagram Illustrating the Pedagogical Integration of AI, AR & VR in Education

Source: *Prepared by the author*

Discussion and Challenges

Existing studies emphasise the growing significance of emerging technologies in education and their potential to transform conventional teaching–learning experiences; however, their pedagogical effectiveness depends on meaningful integration rather than mere adoption. AR, for instance, enhances traditional learning materials through contextual digital overlays and simulated experiences, particularly in scenarios that are either inaccessible or unsafe, thereby supporting deeper conceptual understanding (Bhatnagar, 2024; Kavaklı, et al., 2024). Similarly, AI, AR & VR-enabled learning environments hold significant promise for fostering inclusive education by accommodating learners from diverse, disadvantaged, and differently abled backgrounds. Nevertheless, the smooth integration depends on certain factors like infrastructure, adaptive design, teacher mediation and most importantly, sensitisation of various stakeholders towards understanding the need and importance of technology in education. From a constructivist perspective, the development of virtual and augmented laboratories can further promote curiosity, exploration, and advanced learning, while the combined use of these technologies may enhance collaborative learning and problem-solving skills through shared virtual spaces (Pan, n.d.; Pani et al., 2024). Yet, without adequate pedagogical alignment and institutional support, these collaborative affordances risk remaining underutilised.

Beyond emphasising the immense pedagogical potential of AI, AR & VR, it is very much vital to understand and recognise the barriers that hinder the full use of fully using these technologies. Al Balushi et al. (2024) highlight their vital nature, but they equally emphasises on the obstacles, which include costly equipment, training, and creation of worthy content. There are other technological barriers like the need for adequate training, competent educators and also major concerns are about the quality of content that would be delivered to the learners via these emerging immersive technologies (Pan, n.d; Shihab et al., 2023). Moreover, a critical challenge is the digital divide, which remains a significant barrier despite the proliferation of digital technologies and their usage in educational settings. Bridging this divide is imperative in order to achieve the SDG 4 goal. Accordingly, policy frameworks must prioritise targeted funding, institution-level capacity building and various partnerships in supporting sustainable implementation of these technologies.

In addition, there are certain limitations which include the implementation cost as investment in hardware, software, as well as training of the same, which can be a barrier (Al Balushi et al., 2024); (Bhatnagar, 2024). Moreover, technical complexity is also a challenge and catering to the same requires high expertise that may not be readily available in all the educational institutions (El Boujnani, et al., 2024). The integration of AI in education necessitates clear ethical guidelines and regulatory frameworks to ensure its responsible usage in education (Abdullakutty, et al., 2024). Aligned with constructivist, scaffolding and experiential perspectives, there is a dire need to understand the pedagogical significance of these technologies for effective integration and enhancing learning outcomes.

The integration of AI, AR, & VR reflects a significant pedagogical shift, as also highlighted by UNESCO (MGIEP). It underscores their role in facilitating immersive, personalised, and engaging learning. Globally, educational systems are increasingly experimenting with these technologies, as evidenced by different initiatives such as metaverse-based learning at Arizona State University and South Korea's systematic adoption of immersive technologies in education. In the Indian context, initiatives including Tamil Nadu's *MetaKalvi*, NCERT's promotion of virtual laboratories, IIT Guwahati's *Gyandhara*, and Kerala's KITE program illustrate a growing policy and institutional commitment towards constructivist experiential technology-enabled learning. However, despite demonstrating innovation and intent, the pedagogical effectiveness of these technologies is still not uncovered, as it depends on certain factors like effective implementation, teacher readiness, infrastructural equity, and their sustained alignment with curricular goals. Without addressing these systemic challenges, the transformative potential of AI, AR & VR-enabled education may remain partial or fragmented. Thus, active and reflective engagement with these technologies, supported by policy coherence, capacity building, and active involvement of stakeholders, is essential to fully realize their potential and unveil the unknown. Ensuring equitable access and strengthening teacher capacity are central to enabling the effective use of these technologies in contemporary education. Pedagogically informed integration, supported by adaptive planning, timely interventions, and continuous monitoring, can enhance learner engagement, meaningful knowledge construction & retention, curiosity, collaborative learning and holistic development.

Conclusion

Building on these discussions, this section reflects on the broader implications of integrating AI, AR & VR in education. The pedagogical potential of AI, AR & VR is influential and lies in the ability to transform learning experiences through personalisation, immersive engagement, inclusivity and continuous feedback. Though there are certain challenges that are very much evident and need to be catered in order to completely accept all the features of immersive technologies in our classrooms. However, adequate and little adoption of these in the teaching and learning system either directly or indirectly has the ability of empowering learners with high-quality knowledge. The integration of these technologies in the pedagogical practices has shown tremendous potential in enhancing learning outcomes, engagement, and comprehension. Therefore, it is important to develop an adequate learning environment with visionary leadership of teachers, and in order to do so, it is vital to prepare competent educators, establish a robust technical support system, and provide devices for students and teachers with adequate internet accessibility. It is the need of the hour to understand the true potential of these emerging technologies in the field of education and make maximum use of them. These technologies could be used to maximise the immersive learning environments that have the ability to stimulate real-world scenarios, making learning more engaging and effective and in order to enhance the same, high-quality AR, VR, and AI-based learning resources could be provided to the educators for making classroom transactions and teaching-learning easy and impactful. Moreover, one possible solution is to design immersive & interactive instructional materials, digital educational contents, virtual learning resources and these materials could be stored in a centralised repository for educators to access and utilise the same.

Way Forward

While the promise of these technologies in education is undeniable (OECD, 2021); World Bank, 2020), their implementation must be approached with both enthusiasm and critical awareness. To harness the true potential of emerging technologies, it is imperative to prepare a digital ecosystem, where infrastructure, resources, teacher training, curriculum upgradation, proper student engagement, visionary leadership, timely monitoring and evaluation areas are addressed. As India moves toward a more digitally integrated education system, the focus has to shift from mere adoption of technology to intentional, inclusive and pedagogically sound application. True progress lies not just in embracing technology, but in reimagining learning environments where every learner, regardless of background, can thrive through its thoughtful use.

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CAMPUS NEWS

Capacity Building Programme on Quantitative and Qualitative Research Methods

A two-week Capacity Building Programme on ‘Quantitative and Qualitative Research Methods in Social Sciences’ was organised for the Social Science Faculty Members by the Department of Education in collaboration with the Department of Economics and Development Studies, Central University of Jharkhand (CUJ), Ranchi, from December 01-13, 2025. The event was sponsored by the Indian Council of Social Science Research, New Delhi. The programme aimed to strengthen the research capacities of social science faculty members by providing them comprehensive exposure to contemporary quantitative and qualitative research paradigms, tools and methodologies, and emerging interdisciplinary perspectives of quantitative and qualitative research. A total of 34 participants from different universities and colleges across twelve Indian states attended the event. The participants represented diverse disciplines within the social sciences and their allied fields like Education, Economics, History, Political Science, Global Affairs, Statistics, Anthropology and Tribal Studies, Journalism and Mass Communication, Visual Arts, Sanskrit, English and Korean, etc. A total of twenty-one resource persons from different leading institutions of the country, including Central University of Jharkhand, contributed to the event.

The Inaugural Session was graced by the presence of Prof. C B Sharma, Vice Chancellor, Vinoba Bhave University, Hazaribagh, Jharkhand and Prof. Santosh K Panda, National Fellow, National Institute of Educational Planning and Administration (NIEPA), New Delhi, as esteemed guests. In the inaugural address, Prof. C B Sharma stressed the importance of truth in research, highlighting the need for methodological training in research to promote authenticity and integrity in research. He stated that a researcher should reflect deeply on the purpose, process, and societal relevance of his/her work.

Prof. Santosh K Panda, in his inaugural remarks, highlighted the importance of research for societal development from multidimensional perspectives. He explained its relevance to the Academic Performance Indicator (API) in educational institutions. He also linked research to global and national academic priorities by referring to the World Happiness Index and the National Credit Framework.

The Presidential Address of the session was delivered by Prof. Kshiti Bhushan Das, Vice Chancellor, Central University of Jharkhand, Ranchi. Prof. Das, in his address, emphasised the indispensable need for capacity-building programmes in research to equip scholars and teachers for the evolving academic landscape. Emphasising that research is driven by passion, curiosity, and critical inquiry, he remarked that every teacher must view himself/herself as a researcher.

The programme enlightened and enriched the participants on the latest perspectives of quantitative and qualitative research methods in the social sciences through forty-eight academic sessions. Quantitative research methods, such as descriptive and experimental research, meta-analysis, and causal inference, as well as qualitative research methods, including grounded theory, phenomenology, symbolic interactionism, ethnography, narrative inquiry, content analysis, naturalistic inquiry, decolonial perspectives of research, etc. were the focal points of discussion in the many sessions of the programme. Extensive emphasis was placed on data analysis using parametric and non-parametric statistics, supported by statistical and analytical software like SPSS, STATA, EViews, JAMOVI, and JASP, along with reference management tools such as Zotero and digital and AI-based research tools in many academic sessions of the programme.

The qualitative research data management, coding, scaling, and analysis had a special place in the academic sessions of the event. Mixed-method research was specifically focused during the academic sessions of the programme. Sessions on research reporting, research publication, research proposal writing, research grant preparation, and promotion of research culture, including critical reflections on the Indian Knowledge System in research with reference to the perspectives of quantitative research and qualitative research in the programme, provided participants with a holistic understanding of contemporary research practices. Some of the sessions of the programme further emphasised the effective use of library and e-library resources, complemented by a guided library visit to the Central University of Jharkhand library, which familiarised participants with the academic support services available in the university library.

In an academic session, Prof. Kshiti Bhusan Das, Vice Chancellor, Central University of Jharkhand, engaged the participants with research-oriented interactions, and he appreciated their representation from diverse disciplines, institutions, and states across the country. He remarked that this kind of programme fosters academic excellence by promoting interdisciplinary dialogue and a deeper understanding of social realities. In addition to academic deliberations and interactions, the programme offered hands-on learning through participant-led PowerPoint presentations on research issues, and field exposure-based activities (conducted in anthropological research sites at Patratu valley and Hundru fall of Ranchi) that connect theory with practice. The academic engagement of the event was further complemented by cultural evening(s), an evening notably graced by Padma Shree, Padma Bhushan and Grammy Awardee Pt. Vishwa Mohan Bhatt, whose captivating performance added a distinguished cultural dimension to the programme. These academic and cultural engagements together enriched the participants' learning experiences and contributed significantly to the holistic success of the programme.

The Valedictory Session was graced by the Chief Guest Prof. P C Agarwal, Joint Director, National Council of Educational Research and Training (NCERT), New Delhi. Shri K Koshala Rao, Registrar, Central University of Jharkhand, delivered the presidential address marking the successful completion of the two-week capacity-building programme. In his valedictory address, Prof. P C Agarwal emphasised the importance of continuous professional development of the teachers, underscoring that a teacher must constantly update knowledge and competencies to remain relevant in an ever-evolving academic environment. With these insightful remarks, the programme was concluded successfully, marking a significant milestone for sustained academic engagement and scholarly capacity building of social science faculty members. Prof. Tapan Kumar Basantia, Dean, School of Education, Central University of Jharkhand, Ranchi served as the Course Director of the event, while Dr. Sanhita Sucharita, Assistant Professor, Department of Economics and Development Studies, served as the Co-course Director. The programme not only strengthened participants' research competencies but also led to the development of a vibrant research culture aligned with contemporary academic and societal needs.

Hands-on Workshop on Genome Wide Association Analysis and Marker-assisted Selection for Crop Improvement

A two-day Hands-on Workshop on 'Genome Wide Association Analysis and Marker-assisted Selection for Crop Improvement' is being organised by the Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu from January 05-06, 2026.

The Genome Wide Association Analysis (GWAS) and Marker-assisted Selection (MAS) are important tools in modern crop improvement. GWAS helps identify the precise genetic regions and markers associated with specific target traits such as yield, stress tolerance, disease resistance, and quality. MAS then uses these markers to guide breeders in selecting plants more accurately and efficiently. Together, these approaches make it possible to understand complex traits, speed up breeding programmes, and develop improved crop varieties suited to current agricultural needs. The major theme areas are:

- Marker — Assisted Selection (MAS) for Accurate and Efficient Breeding Decisions.
- Application of DNA Fingerprinting, Marker Assisted Selection and GWAS in Developing Improved, Resilient Crop Varieties.
- Genome Wide Association Analysis (GWAS) for Identifying Trait — Linked Genes and Markers.

Theoretical Sessions

Module - I

Introduction to Molecular Markers (RFLP, RAPD, AFLP, ISSR, SSR, SGAR, SNP, InDeI

Markers, VNTR). Applications of Molecular Markers in Crop Improvement and Marker-Assisted Selection (MAS).

Module - II

Genome-Wide Association Studies for Trait Mopping (GWAS).

Practical Sessions

Module - I

Genotyping and Marker Validation. Preparation of Genotypic and Phenotypic Data Files for Mapping Populations Analysis and Marker-Assisted Selection for Trait.

Module - II

Introduction to GWAS Analysis.

For further details, contact Dr. Y Anbu Selvam, Professor and Head, Department of Genetics and Plant Breeding, Faculty of Agriculture, Annamalai University, Annamalai Nagar- 608 002, Tamil Nadu, Mobile No: 09787069501. For updates, log on to: *www.annamalaiuniversity.ac.in/events/*

International Conference on Advanced Trends in Engineering and Emerging Technologies

A two-day International Conference on 'Advanced Trends in Engineering and Emerging Technologies' is being jointly organised by the Indian Institute of Technology Patna, Bihar National Institute of Technology Raipur, Bihar and New Government Polytechnic Patna, Bihar from January 17-18, 2026 through Hybrid Mode. The event aims to create a dynamic and inclusive platform that bridges the gap between theoretical research, applied technology, and grassroots innovation. It is conceived as a melting pot of AI and ML ideas, additive manufacturing, Cybersecurity, IoT, Green energy, Robotics and Smart cities, fostering dialogue between academia, researchers and industry professionals. The Tracks of the event are:

- Artificial Intelligence (AI) and Machine Learning (ML).
- Internet of Things (IoT) and Industry 4.0.
- Advanced Materials and Nanotechnology.
- Robotics and Mechatronics.
- Green Energy and Sustainability.
- Cybersecurity and Data Protection.
- Digital Construction and Smart Cities.
- Additive Manufacturing (3D Printing).

For further details, contact, Organising Secretary, Indian Institute of Technology Patna, Bihar-801106, Mobile No: 09852016356, 8011242454, 8247220263, 801055831, E-mail : *icateet2026.ngp@gmail.com.* For updates, log on to: *https://conference.ngpp.ac.in/*

For updates, log on to*: https://conference.ngpp.ac.in/*

International Conference on Knowledge Organisation in Academic Libraries

A two-day International Conference on Knowledge Organisation in Academic Libraries (I-KOAL 2026) on the theme 'Preserving Traditional Agricultural Knowledge via Digital Rural Libraries: Integrated Indian Knowledge Systems (IKS) for Sustainable Growth and *Viksit Bharat* 2047' is being organised by the Rajiv Gandhi University, Doimukh, Arunachal Pradesh, in collaboration with the Library Professionals Association (LPA), New Delhi from January 30-31, 2026 at Rajiv Gandhi University, Doimukh, Arunachal Pradesh. The event aims to unite librarians, academicians, researchers, policymakers, and community leaders to explore how academic and rural libraries can preserve and disseminate India's indigenous agricultural wisdom. The themes of the event are:

Role of Libraries and Academic Institutions in Knowledge Integration

- Libraries as Custodians of Indigenous and Modern Knowledge Systems.
- Academic Collaborations for Cross-Disciplinary Research and Knowledge Sharing.
- Institutional Repositories for Open Access to Agricultural Innovations.
- Capacity-building and Professional Development for Library Science Educators.

Vision 2047: Empowering Rural India through Knowledge Systems

- Knowledge-driven Rural Development for *Viksit Bharat 2047.*
- Strengthening Local Governance through Data-informed Decisions.

- Integrating Rural Wisdom with National Development Goals.
- Enhancing Digital Inclusion and Equitable Access to Information.

Sustainable Agriculture and Environmental Stewardship

- Traditional ecological knowledge and sustainable farming practices.
- Agro-biodiversity conservation through community participation.
- Climate-smart agriculture and resilience building.
- Linking environmental ethics with agricultural innovation.

Indian Knowledge Systems in Agriculture

- Ancient Agrarian Texts and Indigenous Cultivation Methods.
- Ayurvedic Principles in Soil and Crop Health Management.
- Community-Based Seed Preservation and Sharing Traditions.
- IKS Pedagogy in LIS Education and Agricultural Training.

Digital Libraries and Knowledge Preservation

- Designing Interoperable Digital Repositories for Rural Knowledge.
- Metadata Standards and Ontologies for IKS Resources.
- Long-term Digital Preservation and Open-source Archiving Tools.
- Enhancing User Accessibility through Multilingual Digital Interfaces.

Rural Libraries: Infrastructures and Libraries Development

- Establishing a Model Digital Rural in Panchayat Clusters.
- ICT Infrastructure for Last-mile Information Delivery.
- Role of Rural Libraries in Local Governance and Civic Awareness.
- Public-private Partnerships for Rural Information Infrastructure.

Policy, Governance and Institutional Support

- National Policies for Library Modernisation and Digital Inclusion.
- Institutional Collaboration for Agricultural Knowledge Integration.
- Policy Frameworks for Community Participation and Sustainability.
- Ethical Governance of Indigenous Data and Intellectual Property Rights.

Education, Literacy and Agricultural Extension

- Integrating Agricultural Literacy into Higher Education Curricula.
- Libraries as Learning Hubs for Farmers and Rural Youth.
- Role of LIS Professionals in Agricultural Extension Services.
- Inclusive Education through Multilingual and Multimedia Resources.

Technology Integration and Innovation

- Artificial Intelligence (AI) and Machine Learning in Knowledge Organisation.
- Internet of Things (IoT) Applications in Agricultural Information Systems.
- Blockchain for Traceability and Authenticity of Traditional Knowledge.
- Virtual and Augmented Reality in Experiential Learning for Rural Communities.

Documentation and Archiving Techniques

- Oral History Documentation and Community Storytelling Methods.
- Digitisation of Manuscripts, Local Records, and Visual Archives.
- Standards for Metadata Creation and Digital Preservation.
- Knowledge Mapping and Taxonomy of Indigenous Practices.

Cultural and Socio-Economic Dimensions

- Gender Roles and Social Inclusion in Agricultural Knowledge Systems.
- Cultural Festivals, Rituals, and Practices in Agrarian Heritage.
- Socio-Economic Benefits of Digital Rural Knowledge Initiatives.

- Libraries as Spaces for Cultural Dialogue and Empowerment.

Future Pathways for Viksit Bharat 2047

- Roadmap for Integrating IKS with Emerging Technologies.
- Strengthening Public–academic–community Partnerships.
- Digital Sovereignty and National Knowledge Repositories.
- Visionary Strategies for Sustainable and Self-reliant India.

For further details, contact Organising Secretary, Dr. Sudhir Kumar Jena, Librarian, Rajiv Gandhi University, Arunachal Pradesh-791112, Mobile No: 08974950350 / 09868803377, E-mail: *conferencelpaindia@gmail.com.* For updates, log on to: *www.lpaindia.in*

AIAER Annual National Conference on Artificial Intelligence AI for Sustainable Education

A two-day National Conference on 'Artificial Intelligence for Sustainable Education: Bridging Tech and the SDGs' is being organised by the SSRMT's SSR College of Education, Saily, Silvassa (UT of Dadra & Nagar Haveli and Daman & Diu), in collaboration with All-India Association for Educational Research (AIAER) from February 13–14, 2026 through hybrid mode. The event aims to provide a national academic forum for academicians, teacher educators, researchers, policymakers, and students to deliberate on the transformative role of Artificial Intelligence in education and its alignment with the United Nations Sustainable Development Goals (SDGs). The Subthemes of the event are:

- Harnessing AI to Unlock the SDGs.
- Converging AI Innovation with the SDGs.
- Intelligent Pathways to Global Goals.
- AI for Educational Research.
- AI for Transforming Tomorrow.
- Innovative Solutions for Sustainable Development.
- AI and Quality Higher Education.
- AI: Boon or Curse for Higher Education.
- AI and Indian Knowledge System.
- AI and Human Resilience for a Sustainable Future.
- Any Other Relevant Topic to the Main Theme.

For further details, contact the Director of the event, Dr. Meena Kute, SSRMT's SSR College of Education, Silvassa, U.T. of Dadra and Nagar Haveli-396230, Mobile No: 09226484317 / 09824549814, E-mail: *ssrconference2026@gmail.com*. For updates, log on to : *https://aiaer.org,* and *www.ssreducollege.edu.in* ☐

ATTENTION READERS

The government is commemorating the 150th birth anniversary of Sardar Vallabhbhai Patel with a two-year-long nationwide programme from 2024 to 2026 to honour his monumental contribution to the country. University News also invites articles on the 'Contributions of Sardar Vallabhbhai Patel to the Nation' . Authors can submit manuscripts throughout the year till September 30, 2026 to Dr Sistla Rama Devi Pani, Editor, University News, via Email: ramapani.universitynews@gmail.com, and also send a copy to: universitynews@aiu.ac.in.

Guidelines for Contributors are available on the AIU Website. For any queries, Contact Dr Yogita Kanwer on mobile no 9968469765 or Office Landline number 011-23230059, Ext 209.

Editor

COMMUNICATION

At the Crossroads: Artificial Intelligence in Education Faces Both Optimism and Concern

Chaitali Sharma*

As Artificial Intelligence (AI) continues to transform industries, its role in education is being met with both excitement and apprehension. According to a new global survey commissioned by Turnitin and conducted by research firm Vanson Bourne, 78% of students, educators, and academic administrators feel optimistic about the impact of AI in classrooms. Yet, paradoxically, 95% believe AI is already being misused in some form.

This duality reveals a growing tension in academic institutions worldwide. On one hand, AI offers transformative potential—streamlining tasks, enhancing learning outcomes, and preparing students for an AI-driven future. On the other, it raises serious concerns around academic integrity, overreliance, and the erosion of critical thinking skills.

The survey, titled ‘Crossroads: Navigating the Intersection of AI and Academia’, captured insights from 3,500 respondents across six countries: Australia, New Zealand, India, Mexico, the United Kingdom/Ireland, and the United States. It included secondary and higher education stakeholders—students, educators, and academic administrators.

One of the clearest concerns voiced by participants was the difficulty of ensuring academic integrity amid growing AI adoption. Transparency in how AI is used by students and educators is now considered essential to maintain trust in the educational process.

“Transparency throughout the student writing process enables educators to leverage the opportunities that AI technologies present while upholding the integrity of original student work,” said Annie Chechitelli, Chief Product Officer at Turnitin. “Navigating a clear path forward means equipping educators with solutions to integrate AI in ways that preserve critical thinking skills and prepare students for the demands of an AI-driven future.”

Despite positive sentiment, the report highlights that students are especially wary of AI misuse. A significant 64% of students surveyed expressed concern, surpassing both educators (50%) and academic administrators (41%). Students also feel particularly vulnerable to learning loss, with 67% admitting they sometimes feel they are shortcutting their education by using AI tools. Half of them also reported uncertainty around how to best use AI for learning purposes.

Meanwhile, academic administrators are more concerned about data privacy and potential security breaches associated with AI platforms, suggesting that the impact of AI reaches beyond pedagogy and into institutional operations.

Interestingly, although many students report concerns, AI use remains widespread—70% of students said they use AI tools at least occasionally for assignments. This suggests that while the risks are well recognised, AI's convenience and perceived academic value continue to drive adoption.

“The research highlights a pivotal moment in academia,” said David Gallichan, Business Strategy & Partnerships Lead at Vanson Bourne. “While there is clear optimism about AI’s potential, there is also significant concern—particularly among students—about its misuse and the lack of preparedness.”

As AI becomes a staple in modern education, creating clear ethical guidelines and fostering open dialogue between students and educators will be critical. Institutions must balance the benefits of AI with robust frameworks that prioritise integrity, transparency, and the cultivation of independent thought.

Sources

- *Crossroads: Navigating the Intersection of AI and Academia*, Turnitin and Vanson Bourne, August 2024.
- Turnitin Press Release and Survey Findings
- Vanson Bourne Market Research – *www.vansonbourne.com* ❑

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THESES OF THE MONTH

SCIENCE & TECHNOLOGY

A List of doctoral theses accepted by Indian Universities

(Notifications received in AIU during the month of Oct-Nov, 2025)

AGRICULTURAL & VETERINARY SCIENCES

Epidemiology

1. Arvinderpal Singh. **Studies on emerging zoonotic and transboundary viral diseases in Northwestern India**. Department of Veterinary Public Health & Epidemiology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana.

Horticulture

1. Galande, Harshada Ramesh. **Heterosis and combining ability studies in Tomato (*Solanum lycopersicum* L)**. (Dr. V S Khandare), Department of Horticulture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani.

Soil Science

1. Anshu. **Impact of long term nutrient management practices on ferrolysis induced soil transformation in an acid alfisol**. (Dr. N K Sankhyan), Department of Soil Science, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur.
2. Avte, Shubhangi Basveshwar. **Assessment of solubilization potential of promising potassium mobilizing bacterial isolates in *Bt* cotton**. (Dr. A L Dhamak), Department of Soil Science and Agricultural Chemistry, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani.

BIOLOGICAL SCIENCES

Biochemistry

1. Iqra Farooq. **Assessment of immune response in SARS-CoV-2 infected patients from Kashmir: A cohort study**. (Dr. Rafiqa Eachkoti and Dr. Masood Tanvir), Department of Biochemistry, University of Kashmir, Srinagar.
2. Wani, Javaid Ahmad. **Expression analysis of candidate microRNAs and proteins as minimally invasive biomarkers in lung cancer patients of Kashmiri population**. (Prof. Sabhiya Majid, Dr. Akbar Masood and Prof. Naveed Nazir), Department of Biochemistry, University of Kashmir, Srinagar.

Biotechnology

1. Ajay Kumar. **In silico docking based screening of phytoconstituents as New Delhi Metallo-B-Lactamase I (NDM-I) inhibitors for combating antimicrobial drug resistance**. (Prof. S K Gahlawat and Dr. Ajmer Singh), Department of Biotechnology, Chaudhary Devi Lal University, Sirsa.
2. Arif Ali. **To understand the cancer signalling pathway involving the role of MKK6 protein**. (Prof. F A Khanday), Department of Biotechnology, University of Kashmir, Srinagar.
3. Biswas, Santasree Sarma. **In *silico* studies of phytocompounds as inhibitors of efflux pumps-Rv 0194 and Rv 1258c to fight against multidrug resistance in *Mycobacterium tuberculosis***. (Dr. Jayanti Datta Roy), Department of Biotechnology, Assam Don Bosco University, Guwahati.
4. Sarma, Sudipta. **Exploring on developing a novel approach to generate transgenic cell lines with high efficiency and accuracy**. (Dr. Shiny C Thomas and Dr. Rohan Kamat), Department of Biotechnology, Assam Don Bosco University, Guwahati.
5. Singh, Pinki Kumari. **Metabolomic profiling and quantification of hormones from vegetative to reproductive growth phases in lagenaria siceraria (Molina) Standl**. (Dr. Pachaiappan R), Department of Biotechnology, SRM Institute of Science and Technology, Kattankulathur, Chennai.

Botany

1. Ishrat Shaheen. **Assessment of structural attributes and functional ecology of some grassland ecosystems in Kashmir Himalaya**. (Prof. Manzoor Ahmad Shah and Prof. Mahesh Sankaran), Department of Botany, University of Kashmir, Srinagar.

Life Science

1. Chandra, Sreyashi. **Neurodevelopmental defects in the hippocampus caused by pre-natal exposure to valproic acid**. (Dr. Prem Prakash Tripathi), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

2. Kotipalli, Rama Satya Sri. **Pharmacological intervention and molecular mechanisms in mitigation of PCOS characteristics in mice models**. (Dr. Sistla Ramakrishna and Dr. K Muralidharan), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.
3. Manpreet Kaur. **Conformational studies on EmrE efflux pump and its inhibition**. (Dr. Balvinder Singh), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.
4. Rhythm, Phutela. **Systematic understanding of the DNA repair mechanisms induced by Cas9 mediated cleavage**. (Dr. Debojyoti Chakraborty), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.
5. Saini, Ravina. **Mechanism of transgenerational epigenetic inheritance in *Drosophila melanogaster***. (Dr. Rakesh Kumar Mishra and Dr. Manjula Reddy), Faculty of Biological Sciences, Academy of Scientific and Innovative Research, Ghaziabad.

Microbiology

1. Kavya, S P. **In vitro and in vivo characterization of antimicrobial compounds from medicinal plants against *Candida Albicans***. (Dr. N Mallikarjun), Department of Microbiology, Kuvempu University, Shankaraghatta.

Zoology

1. Bharti, Pooja. **Morphological and phylogenetic assessment of genus Eimeria infecting broilers of central Kashmir with emphasis on its management**. (Prof. Syed Tanveer and Dr. Zahoor Ahmad Wani), Department of Zoology, University of Kashmir, Srinagar.
2. Mohd Ali. **Diversity of aphids (*Hemiptera: Aphididae*) in selected sites of Ladakh with emphasis on management of predominant species of some crops**. (Prof. Tariq Ahmad and Prof. Barkat Hussain), Department of Zoology, University of Kashmir, Srinagar.
3. Raval, Pooja Jayprakash. **The role of TGF-β in the selective activation of regenerative response: A comparative study of wound healing and EMT in the amputated appendages of lizard, Hemidactylus Flaviviridis**. (Prof. B Suresh), Department of Zoology, Maharaja Sayajirao University of Baroda,Vadodara.
4. Sana, Sayed Zarin. **Study on the effect and bioaccumulation of some trace elements on vital organs of selected crap species in Kashmir Himalayas**. (Prof. Syed Tanveer and Prof. Farooz Ahmad Bhat), Department of Zoology, University of Kashmir, Srinagar.

EARTH SYSTEM SCIENCES

Environmental Science

1. Singh, Namrata. **Assessment of particle-bound Polyclinic Aromatic Hydrocarbons (PAHs) and potential of trees as bio-filters**. (Dr. Charu Jhamaria), Department of Environmental Science, IIS (Deemed to be University), Jaipur.

Geology

1. Behera, Ramesh Chandra. **Mineral chemistry and trace element systematics of pyrite and its implications on the invisible gold mineralization within the vempalle dolostone and dolerite of North-Western Cuddapah Basin, Southern India**. (Prof. Sahendra Singh), Department of Applied Geology, Indian Institute of Technology, Dhanbad.
2. Wani, Mohammad Irfan. **Tectono-geomorphic evolution of Zanskar Basin, NW Himalaya, India**. (Prof. Bikram Singh Bali), Department of Earth Sciences, University of Kashmir, Srinagar.

Geophysics

1. Sharma, Dheeraj Kumar. **Heterogeneous buoyancy-driven flows with dynamo action in a spherical shell modelling the Earth's outer core**. (Prof. Swarandeep Sahoo), Department of Applied Geophysics, Indian Institute of Technology, Dhanbad.

ENGINEERING SCIENCES

Chemical Engineering

1. Shastri, Anurag Kumar. **Characterization stabilization and rheological analysis of slurries formed from Indian high-ash coals with additives**. (Prof. Suresh Kumar Yatirajula), Department of Chemical Engineering, Indian Institute of Technology, Dhanbad.

Civil Engineering

1. Panday, Vijayant. **Phytoremediation of wastewater originating from various sources using macrophytes: A study of river Kahn**. (Dr. Anand Babu), Shri Vaishnav Institute of Technology and Science, Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore.

Computer Science & Engineering

1. Abhilash. **Modeling and simulation of discrete event dynamic system with reference to biological pathways**. (Dr. Rajendra Prasad Mahapatra), Department of Computer Science and Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.
2. Asthana, Priyanka. **Design and development of machine learning algorithm for analytical evaluation of students performance**. (Dr. Manish Maheshwari and Dr. Babita Agrawal), Department of Computer Science & Applications, Makhanlal Chaturvedi National University of Journalism and Communication, Bhopal.
3. Cassim, Mohamed Mohamed Mansoor. **A study on smart healthcare system for ambient assisted living of older adults with chronic health condition**. (Dr. Sarat Kumar Chettri and Dr. H M M Naleer), Department of Computer Science and Engineering, Assam Don Bosco University, Guwahati.
4. Chauhan, Shivendra Singh. **Devising efficient solutions for future trading using AI based big data and IOT model**. (Dr. Hari Om Sharan), Department of Computer Science & Engineering, Rama University, Kanpur.
5. Chikara, Sonam. **An optimization of cryptographic algorithm to enhance security in cloud computing**. (Dr. Nishant Pathak), School of Computational Sciences and Engineering, Shobhit Institute of Engineering & Technology Deemed to be University, Meerut.
6. Desai, Heta Subhashchandra. **Design and development of gesture and face detection through video Surveillance**. (Dr. Atul M Gonsai), Department of Computer Science, Saurashtra University, Rajkot.
7. Godala, Sravanthi. **Enhancing intrusion detection in wireless sensor networks using deep learning techniques**. (Dr. M Sunil Kumar), Department of Computer Science and Engineering, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.
8. Gupta, Shilpi. **Developing a framework to improve the performance of multiple aspect based opinion mining**. (Prof. Niraj Singhal), School of Computational Sciences and Engineering, Shobhit Institute of Engineering & Technology Deemed to be University, Meerut.
9. Jayanthi, Appawala. **Personalized Medicine using Cognitive Computing (PM2C): A framework to predict chronic diseases and recommend personalized treatment**. (Dr. B Eswara Reddy), Department of Computer Science and Engineering, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.
10. Mohmad Azhar. **Design and development of an efficient deep learning framework for personality analysis**. (Dr. Manzoor Ahmad Chachoo), Department of Computer Sciences, University of Kashmir, Srinagar.
11. Punuri, Sudheer Babu. **Human Facial expression mining in unconstrained environment**. (Dr. Sanjay Kumar Kuanar and Dr. Tusar Kanti Mishra), Department of Computer Science and Engineering, GIET University, Gunupur.
12. Sahoo, Saswati. **Design and implementation of data augmentation based integrated predictive analytics approach for brain tumor assessment**. (Dr. Sushruta Mishra), KIIT School of Computer Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
13. Shanthalakshmi, M. **An intelligent threat detection and privacy-preserving authentication in autonomous vehicular networks**. (Dr. Ponmagal R S), Department of Computer Science and Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.
14. Sharma, Pooja. **Analysis of machine learning techniques for prognosis using biomedical NLP**. (Dr. Manish Maheshwari and Dr. C P Agrawal), Department of Computer Science & Applications, Makhanlal Chaturvedi National University of Journalism and Communication, Bhopal.
15. Sharma, Vaibhav. **Design and development of optimal algorithm to optimize inventory decisions**. (Dr. Yogesh Awasthi and Dr. Sanjay Kumar), School of Computational Sciences and Engineering, Shobhit Institute of Engineering & Technology Deemed to be University, Meerut.
16. Sudha Rani, L. **Deep learning approaches for optimizing sentiment analysis on X (Twitter)**. (Dr. S Zahoor Ul Huq and Dr. C Shoba Bindu), Department of Computer Science and Engineering, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

17. Vijayalakshmi, V. **Hybrid bio-inspired and learning algorithm approaches for intelligent task scheduling in industrial IOT**. (Dr.M Saravanan), Department of Computer Science and Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.
18. Vishnoi, Navneet. **Designing dynamic adjustment approach of event reliability in wireless sensor network**. (Prof. R K Dwivedi), Department of Computer Applications, Teerthanker Mahaveer University, Moradabad.
19. Vyas, Dhairya Jagdipchandra. **Designing preventive techniques to handle adversarial machine learning attacks**. (Dr. Viral Vinodbhai Kapadia), Department of Computer Science & Engineering, Maharaja Sayajirao University of Baroda, Vadodara.

Electrical & Electronics Engineering

1. Biswal, Soumya Ranjan. **Analysis and implementation of ML driven DSM for optimized energy consumption in a grid connected smart greenhouse**. (Dr. Babita Panda and Dr. Tanmoy Roy Choudhury), KIIT School of Electrical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
2. Gaurav Kumar. **Design of silicon photonic switches based on multi-mode interference coupler**. (Prof. Devendra Chack), Department of Electronics Engineering, Indian Institute of Technology, Dhanbad.
3. Jayavani, L. **Control techniques for performance enhancement in DC microgrid**. (Dr. S Satyanarayana and Dr. K Jithendra Gowd), Department of Electrical & Electronics Engineering, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.
4. Tripathy, Poonam. **Development and analysis of generalized integrator-based phase-locked loops for synchronization under adverse grid scenarios**. (Dr. Banishree Misra and Dr. Byamakesh Nayak), KIIT School of Electrical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.

Electronics & Communication Engineering

1. Makala, Bindupriya. **Deep learning-based classification of diabetic retinopathy and glaucoma for early comorbidity detection**. (Dr. Manojkumar D), Department of Electronics and Communication Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.
2. Malle, Raveendra. **Optimized deep learning framework for video forensic**. (Dr. K Nagi Reddy), Department of Electronics & Communication Engineering, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

Mechanical Engineering

1. Chaudhuri, Abhik. **Mechanical and biological behaviours of cellular porous structures for HIP implant applications: Numerical and experimental investigations**. (Prof. Prashanta Kumar Mahato and Prof. Bidyut Pal), Department of Mechanical Engineering, Indian Institute of Technology, Dhanbad.
2. Das, Manas Ranjan. **A study on sustainable waste management practices in Indian iron ore mining industries**. (Dr. Suchismita Satapathy and Dr. Lalit Kumar Pothal), KIIT School of Mechanical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
3. Dash, Soumya. **Investigation and optimization of stacking sequences in hybrid carbon-Kevlar-Basalt-glass epoxy composites for enhanced wear resistance and machinability**. (Dr. Bharat Chandra Routara and Dr. Mantra Prasad Satpathy), KIIT School of Mechanical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
4. Mishra, Binayak. **Numerical and experimental study of equal channel angular pressing of AL-6063 aluminium alloy**. (Dr. Sambit Kumar Mohapatra and Dr. Ajit Behera), KIIT School of Mechanical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
5. Mondal, Krishnendu. **Optimization of ECDM parameters for optimal micro machining performance of non-conductive materials**. (Dr. Jayanta Kumar Mahto and Dr. Bijan Mallick), School of Electrical, Electronics & Mechanical Engineering, Shobhit Institute of Engineering & Technology Deemed to be University, Meerut.
6. Soni, Sheetal Sujaykumar. **Development, characterization and machinability assessment of AI based metal matrix composite**. (Dr. Piyush Gohil), Department of Mechanical Engineering, Maharaja Sayajirao University of Baroda, Vadodara.
7. Yadav, Manvendra. **Experimental investigation of solid particle erosion behavior of AI metal matrix composites**. (Prof. L A Kumaraswamidhas), Department of Mechanical Engineering, Indian Institute of Technology, Dhanbad.

MATHEMATICAL SCIENCES

Mathematics

1. Dave, Drashti Krutarth. **Identification, analysis and control of breast cancer using mathematical techniques**. (Dr. Trupti P Shah), Department of Applied Mathematics, Maharaja Sayajirao University of Baroda, Vadodara.
2. Hassan, Fauzia. **Design and analysis of key management frameworks for digital twin technology using cryptographic techniques**. (Dr. Anil Kumar Nishad), School of Humanities, Physical & Mathematical Sciences, Shobhit Institute of Engineering & Technology Deemed to be University, Meerut.
3. Malviya, Ghanshyam Laduram. **Mathematical modelling and controllability analysis of coal pulveriser performance in coal mills**. (Dr. Jaita Sharma), Department of Applied Mathematics, Maharaja Sayajirao University of Baroda,Vadodara.
4. Najar, Amir Rehman. **On the adjacency Eigenvalues of graphs and Turan type problems**. (Prof. Shariefuddin Pirzada), Department of Mathematics, University of Kashmir, Srinagar.
5. Pragya Kumari. **Bayesian models and classification of high dimensional gene expression data**. (Prof. Gajendra Kumar Vishwakarma and Dr. Atanu Bhattacharjee), Department of Mathematics and Computing, Indian Institute of Technology, Dhanbad.
6. Rashid, Mir Riyaz Ul. **On the distribution of Eigenvalues in signed graphs**. (Prof. Shariefuddin Pirzada), Department of Mathematics, University of Kashmir, Srinagar.

Statistics

1. Ahmed, Fayaz. **On new weighted generalized divergence measures and their applications**. (Prof. M A K Baig), Department of Statistics, University of Kashmir, Srinagar.
2. Manjusha, M. **Statistical modelling and prediction of anemia and child malnutrition from NFHS-5**. (Dr. P Pranay), Department of Mathematics and Statistics, Chaitanya (Deemed To Be University), Himayatnagar, Hyderabad.

MEDICAL SCIENCES

Biotechnology

1. Biswas, Mainak. **To improve the therapeutic efficacy of engineered novel L-asparaginase variants for the treatment of Acute Lymphoblastic Leukemia (ALL)**. (Dr. Avinash Sonawane and Dr. Snehasish Mishra), KIIT School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar.

Dentistry

1. Panda, Sanjukta. **Comparative evaluation of different school oral health education methods in improving children's oral health status: A randomised control trial**. (Dr. Abhinash Mohapatra and Dr. Mohammad Jalaluddin), Kalinga Institute of Dental Sciences, Kalinga Institute of Industrial Technology, Bhubaneswar.

Forensic Science

1. Pithiya, Grishma Khimabhai. **Forensic anthropological studies of endogamous communities in Gujarat**. (Dr. Ankita Patel), Department of Biochemistry and Forensic Science, Gujarat University, Ahmedabad.

Pharmaceutical Science

1. Bharathi, M. **Data-driven prediction of dissolution profiles and optimization of metformin hydrochloride sustained release tablets using deep neural network**. (Dr Kamaraj R), Department of Pharmacy, SRM Institute of Science and Technology, Kattankulathur, Chennai.
2. Dabke, Amit Prakash. **Formulation in vitro-in silico evaluation and development of pharmacokinetic models for sustained release formulations of antiemetic drugs**. (Prof. Krutika Sawant and Dr. Ajay J Khopade), Department of Pharmacy, Maharaja Sayajirao University of Baroda,Vadodara.
3. Samarth Kumar. **Design, development and characterization of drug delivery system for bioactive(s)**. (Prof. Krutika Sawant and Dr. Ajay J Khopade), Department of Pharmacy, The Maharaja Sayajirao University of Baroda, Vadodara.
4. Vankani, Ankit Krushnachandra. **Design, development and evaluation of nanocarriers loaded with drug combinations for the management of cancers predominant in women**. (Prof. Krutika Sawant), Department of Pharmacy, Maharaja Sayajirao University of Baroda,Vadodara.
5. Venkatesan, S. **Machine learning based screening of selective carbonic anhydrase IX and XII inhibitors as anti-cancer agents**. (Dr. Kathiravan M K), Department of Pharmacy, SRM Institute of Science and Technology, Kattankulathur, Chennai.

PHYSICAL SCIENCES

Chemistry

1. Krishnamurthy, P. **Development of highly efficient non precious transition metal based chalcogens as electrocatalysts for hydrogen and oxygen evolution reactions in alkaline medium**. (Dr. Maiyalagan T), Department of Chemistry, SRM Institute of Science and Technology, Kattankulathur, Chennai.

2. Mishra, Reenu. **Impact of industrial and urbanisation activities on Kelo river water in agricultural perspective of toxic elements with phytoremediation at Raigarh City and its adjoining areas**. (Dr. P K Singh), Department of Chemistry, Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh.
3. Naveen, M V. **Synthesis characterization, electrochemical and photocatalytic applications of metal oxide and sulphide nanoparticles**. (Dr. Anitha and Dr. G Krishnamurthy), Department of Industrial Chemistry, Kuvempu University, Shankaraghatta.
4. Nayak, Nibedita. **Multifunctional nanostructures: Anticancer and antibacterial potential of green synthesized Mn and Mg-Doped CeO2 nanoparticles and photocatalytic efficiency of MXene/GO/CeO2 nanocomposites**. (Dr. Tapas Ranjan Sahoo), Department of Chemistry, Kalinga Institute of Industrial Technology, Bhubaneswar.
5. Pachauri, Rashmi Devendra. **Studies on characterisation and application of various antimicrobial and U V protection finishes on different cellulosic substrates in a sustainable approach**. (Dr. Jayendra N Shah), Department of Textile Chemistry, Maharaja Sayajirao University of Baroda, Vadodara.

Physics

1. Gohel, Ankit Rajeshkumar. **Study of radiation shielding materials for high energy particles**. (Dr. Rajnikant Makwana), Department of Physics, Maharaja Sayajirao University of Baroda, Vadodara.
2. Kamesh, S. **Investigating the performance of zinc cobaltite as counter electrode material for Dye-Sensitized Solar Cell (DSSC) application**. (Dr. Archana J), Department of Physics, SRM Institute of Science and Technology, Kattankulathur, Chennai.
3. Saranya, V. **Bifunctional performance of cobalt-based spinel oxides and metal-organic framework for dye-sensitized solar cells and electrocatalytic water splitting applications**. (Dr. Archana J), Department of Physics, SRM Institute of Science and Technology, Kattankulathur, Chennai.
4. Soni, Sahil. **Rare earth and group-III nitride alloys: An ab initio study**. (Prof. Dharamvir Singh), Department of Physics, Chaudhary Devi Lal University, Sirsa.

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					Maths	Physics	English	Chemistry	Civil
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Professor (Regular Basis)	01	01	01	01	--	--	--	--	--
Associate Professor (Regular Basis)	02	02	02	01	--	--	--	--	--
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Assistant Professor (Contract Basis)	01#	02	02	01	01	01	01	01	01
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2.	**Controller of Examination***	01	UR	53100-167800 Pay Matrix Level 9
3.	**Librarian***	01	UR	44900-142400 Pay Matrix Level 8

Candidates are requested to do visit university **website: www.baou.edu.in** for all details like application form, application fee, general instructions, necessary educational qualifications, experience, age, service terms and conditions and other relevant details for said posts.

NOTE:

1) Online submission on or before Dt. 16/ 01/2026 till 23:59 Hrs and Submission of printout of online application on or before Dt. 20/01/2026 till 17:00 Hrs. through Speed Post/ Courier only.
2) Appointment of the Controller of Examination shall be for a term of five years or till he attains the age of superannuation.

* Those who have applied earlier in response to our previous advertisements must apply afresh.

Date: 24/12/2025

Registrar

Sonopant Dandekar Shikshan Mandali's

Sonopant Dandekar Shikshan Mandali's Arts, Commerce and Science Womens College, Palghar

At. Kharekuran Road, Palghar (W), Tal. & Dist - Palghar, Maharashtra – 401 404

APPLICATIONS ARE INVITED FOR THE FOLLOWING POSTS FROM THE ACADEMIC YEAR 2025-26:

UNAIDED

Sr. No.	Cadre	Total No. of Posts	Category
1.	Principal	01	01 - OPEN

The above posts are open to all, however, candidates from any category can apply for the post.

Reservation for women will be as per **University Circular No. BCC/16/74/1998 dated 10th March, 1998. 4% reservation shall be for the persons with disability as per University Circular No. Special Cell/ ICC/2019-20/05 dated 05th July, 2019.**

Candidates having knowledge of Marathi will be preferred.

"Qualifications, Pay Scales and other requirement are as prescribed by the UGC Notification dated 18th July, 2018, Government of Maharashtra Resolution No. Misc-2018/C.R.56/18/UNI-1, dated 8th March, 2019 and University Circular No. TAAS/(CT)/ICD/2018-19/1241, dated 26th March, 2019 and revised from time to time."

The Government Resolution & Circular are available on the website: mu.ac.in

Applicants who are already employed must send their application through proper channel.

Applicants are required to account for breaks, if any, in their academic career.

Applications with full details should reach the **SECRETARY, Sonopant Dandekar Shikshan Mandali's, Sonopant Dandekar Shikshan Mandali's Arts, Commerce and Science Womens College, Palghar, At. Kharekuran Road, Palghar (W), Tal. and Dist. - Palghar, Maharashtra – 401404 within 15 days** from the date of publication of this advertisement. **This is University approved advertisement.**

Sd/-
SECRETARY

INDIRA GANDHI INSTITUTE OF DEVELOPMENT RESEARCH

(Deemed to Be University)

Address : Gen. A.K. Vaidya Marg, Film City Road, Santosh Nagar, Goregaon(E)-Mumbai: 400065, Maharashtra

ADMISSION NOTICE 2026

Indira Gandhi Institute of Development Research (IGIDR) will be taking admission to Master of Science in Economics and Master of Science in Energy, Environment and Climate Change through CUET-PG.

M.Sc. (Economics) and M.Sc. (Energy, Environment and Climate Change) at IGIDR are two-year programmes commencing from August 2026.

Eligibility for M.Sc (Economics)

(i) The applicants to M.Sc. programme must have Mathematics at 10+2 level or its equivalent from NIOS or at higher level

(ii) The applicants to M.Sc. programme must have the qualifying percentage of marks or its **equivalent** in the qualifying degrees as indicated below:

Programme	Qualifying Degree	Qualifying Marks across categories of students	
		GEN (GEN-EWS)	SC/ST/ PwD/ OBC-NCL
M.Sc. (Economics)	*BA / BSc Economics*	*55%*	*50%*
	BCom / BStat /B.Sc (Physics / Mathematics)/ BTech / BE	*60%*	*55%*

Note: GEN is General, GEN-EWS is General Economically Weaker Section, OBC-NCL is Other Backward Class-Non-Creamy Layer, PwD is People with Disability, SC is Schedule Caste, ST is Scheduled Tribe.

Eligibility for M.Sc (Energy, Environment and Climate Change)

(I) The applicants to M.Sc. programme must have Mathematics at 10+2 level or its equivalent from NIOS or at higher level.

(ii) The Applicants to M.Sc. programmes must also have the qualifying percentage of marks or its **equivalent** in the qualifying degrees as indicated below:

Programme	Qualifying Degree	Qualifying Marks across categories of students	
		GEN (GEN-EWS)	SC/ST/ OBC-NCL/PwD
M.Sc.(Energy, Environment and Climate Change)	*BA/BSc/BStat*	*55%*	*50%*
	BTech/BE (Any stream)	*55%*	*50%*

Note: GEN is General, GEN-EWS is General Economically Weaker Section, OBC-NCL is Other Backward Class-Non-Creamy Layer, PwD is People with Disability, SC is Schedule Caste, ST is Scheduled Tribe.

Reservation Policy: As per Government of India (GOI) rules. Applicants availing of reservations must produce the necessary documents as per GOI rules.

Need-based scholarship is available for M.Sc. Students as per Institute's norms. Students availing need-based scholarships are required to submit Income Certificate of family issued by the Revenue Authority/competent authority of the respective State Government/Union Territory.

For details please visit

http://www.igidr.ac.in/academic-programmes/admission-2026/

Contributors

1. **Prof. Abhijit Dutta,** Vice Chancellor, Sikkim University.
2. **Dr. Amit Ganatra,** Provost (Vice Chancellor), Parul University, Vadodara, Gujarat
3. **Prof (Dr.) Ankur Kulkarni,** Vice Chancellor, SAGE University, Indore
4. **Prof. Anusha C Koti,** Assistant Professor of Law at KLE Law College, Bengaluru
5. **Bhavana Devi**, Tekcham, Research Scholar, Manipur University
6. **Prof. (Dr.) Debashis Bandyopadhyay,** Vice Chancellor, KISS- DU, Bhubaneswar
7. **Dr. Dhanawantri L. Singha**, Assistant Professor, Rabindranath Tagore University, Assam
8. **Dr. Hidam Ajit Meetei, Assi. Prof.,** Ancient Hist. and Archaeology Dept., Manipur University
9. **Dr. J. M. Vyas**, Vice Chancellor, National Forensic Sci. University, Gandhinagar, Gujarat
10. **Prof. Javed Musarrat,** Vice Chancellor, Integral University, Lucknow
11. **Dr. Jayanthi V,** Vice Chancellor, Sapthagiri NPS University, Bengaluru
12. **Prof. K. K. Aggarwal,** President, South Asian University (SAU), New Delhi
13. **Prof. (Dr.) K P Yadav,** Vice Chancellor, Mats University, Raipur, Chhattisgarh
14. **Prof. (Dr.) K. Prathapan,** Vice Chancellor, D. Y. Patil Agriculture & Technical University
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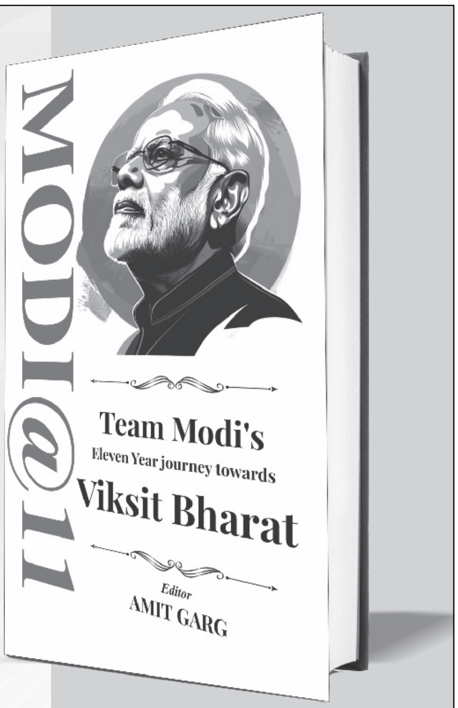
18. **Er. Kordor Lamare,** Executive Engineer (WR), Department of Water Resources
19. **Dr. Krishnan Chalil,** Professor and Head, Central University of South Bihar, Gaya
20. **Prof. (Dr.) Madan Mohan Goel,** Vice Chancellor, Starex University, Gurugram
21. **Prof. Manabendra Dutta Choudhury,** Vice Chancellor, Rabindranath Tagore University, Assam
22. **Prof. (Dr.) Manpreet Singh Manna,** Vice Chancellor, Chandigarh University, Punjab
23. **Dr. Mohammad Samir Hussain,** Post Doctoral Fellow, Manipur University
24. **Dr. N Vani Shree,** Principal, JSS Law College (Autonomous), Mysuru, Karnataka
25. **Prof. Nagaraj Ramrao,** Vice Chancellor, Mohan Babu University, Tirupati, Andhra Pradesh
26. **Prof. (Dr.) Narasingha Charan Panda,** Vice Chancellor, Central University of Odisha
27. **Dr. Naresh Kumar Tiwari,** Vice-Chancellor SAM GlobalUniversity, Madhya Pradesh
28. **Dr. Priyesh P. Gandhi,** Vice Chancellor, Sigma University, Vadodara
29. **Dr. Radha Krishan Dhiman,** Director, Sanjay Gandhi PG Institute of Medical Sci., Lucknow
30. **Prof. (Dr.) Raj Kumar Kothari,** Vice-Chancellor, The Sanskrit College & University, Kolkata
31. **Prof. (Dr.) Rajeev Bhardwaj**, Pro Vice Chancellor, DBS Global University, Dehradun
32. **Dr. Rajeev Manhas and Pratibha,** Dep. Lib. & Head, BabaFarid Univ. of Health Sci., Punjab
33. **Ms. Rajeswari H,** Principal, JSS Law College (Autonomous), Mysuru, Karnataka
34. **Prof. (Dr.) Rajul K. Gajjar,** Vice Chancellor, Gujarat Technological University
35. **Prof. Santosh Kumar Tripathy,** Vice Chancellor, Fakir Mohan University, Vyasa, Balasore, Odisha
36. **Dr. Shyam Sundar Rath,** Vice Chancellor, National Sports University, Manipur
37. **Prof. Som Nath,** Vice Chancellor, Kurukshetra University, Kurukshetra
38. **Prof. (Dr.) Sudhir Kumar Sharma,** Director, Swarnim Gujarat Sports University, Gujarat
39. **Prof.(Dr.) Surender Kashyap,** Vice Chancellor, Atal Medical & Research University, HP
40. **Dr. Tankeshwar Kumar,** Vice Chancellor, Central University of Haryana, Mahendergarh
41. **Vijnana Bharti,** Madhya Bharat Prant, SAM Global University.



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TEAM MODI'S ELEVEN YEAR JOURNEY TOWARDS VIKSIT BHARAT

Editor: AMIT GARG

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Announcement
for
Special Issues of 'University News'

Special Numbers of the University News on two different themes are being brought out on the occasion of AIU Zonal Vice Chancellors' Meets—2025-26. The Special Numbers will cover the articles invited from eminent educationists and practitioners of higher education. 'University News' invites you, the Readers, also to contribute to the Special Numbers by submitting papers/articles. You can find details below:

THEME 1: PROMOTING ENTREPRENEURSHIP AND STARTUPS IN HIGHER EDUCATION INSTITUTIONS (HEIS)

Special Issue on this theme will be brought out on **January 19, 2026** on the occasion of South Zone Vice Chancellors' Meet—2025-26 to be held at M S Ramaiah University of Applied Sciences, Bengaluru on **January 20-21, 2026**. Subthemes for this Special Issue are:

- ***Education for Increasing Entrepreneurship Mindset in Students.***
- ***Establishing Incubation and Innovation Centres to Promote Techno-Nationalism.***
- ***University–Industry Collaboration for Startup Development.***

The last date for submission of articles for this Special Issue is January 08, 2026.

THEME 2: CREATING AI AND QUANTUM-ENABLED HEIS

Special Issue on this theme will be brought out on February 16, 2026 on the occasion of Central Zone Vice Chancellors' Meet—2025-26 to be held at Osmania University, Hyderabad on **February 19-20, 2026**. Subthemes for this Special Issue are:

- ***Integrating AI and Quantum Technologies into Higher Education Curriculum, Pedagogy and Governance.***
- ***AI-Driven Indigenous Research and Product Development.***
- ***Global Regulatory Framework for AI and Ethics in AI.***

The last date for submission of articles for this Special Issue is February 06, 2026.

Manuscripts may be sent to Dr Sistla Rama Devi Pani, Editor, University News, Association of Indian Universities, AIU House, 16 Comrade Indrajit Gupta Marg (Kotla Marg), New Delhi- 110 002, through E-mail: *ramapani.universitynews@gmail.com* with a copy to: *universitynews@aiu.ac.in.* Guidelines for contributors are placed on the AIU Website, *www.aiu.ac.in*. Papers will be published in the Issue, subject to the approval of the Editorial Committee of the University News. In case of space or time constraints, the articles submitted for these Issues can also be considered for publication in the general Issues.

Interested Universities/Institutions, Government Agencies, Publishers or recognised and reputed Organisations dealing with Education may give their Advertisement for publication in the Special Issues. The Issues will have Special visibility. Advertisement Tariff is available on the AIU Website: *www.aiu.ac.in*

For any queries, Contact Dr Yogita Kanwer on her mobile number 09968469765 or office landline number 011-23230059, Ext. 209.

Edited, Printed and Published by Dr Sistla Rama Devi Pani, on behalf of the Association of Indian Universities, AIU House, 16 Comrade Indrajit Gupta Marg (Kotla Marg), New Delhi-110 002. Phones: 23230059 (6 Lines). Fax: 011-23232131, E-Mail : sgoffice@aiu.ac.in, advtun@aiu.ac.in, publicationsales@aiu.ac.in, subsun@aiu.ac.in (for subscription), ramapani.universitynews@gmail.com, unaiu89@gmail.com, universitynews@aiu.ac.in, Website: http://www.aiu.ac.in
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