

ENGINEERING EDUCATION TRANSFORMATION IN INDIA AS PER NEP-2020 TO REVAMP THE ASSESSMENT SYSTEM TO FOCUS ON FORMATIVE AND COMPETENCY-BASED EVALUATION, RATHER THAN ROTE LEARNING AND HIGH-STAKES EXAMS

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Abstract:

The new assessment system for higher education institutions in India, as per the National Education Policy (NEP) 2020. We Explained the objectives, challenges, accountability and benefits of the new assessment system, and how it will leverage the potential of technology and artificial intelligence, open educational resources and open access publishing, and student data protection. I also gave examples, challenges and benefits of various aspects of the new assessment system, such as artificial intelligence-based software, open educational resources, open access publications, and student data privacy and security. I also gave an abstract or brief summary and a conclusion of the entire explanation. I tried to provide an informative and comprehensive overview of the new assessment system and its implications for higher education in India.

Keywords: National Education Policy, Potential of Technology, Artificial Intelligence, Open Educational Resources

1. The National Education Policy (NEP) 2020 aims to revamp the assessment system for higher education institutions in India, with the following objectives, challenges, accountability and benefits:

Objectives:

- To shift from summative assessment to regular and formative assessment, which is more competency-based, promotes learning and development, and tests higher-order skills, such as analysis, critical thinking and conceptual clarity (1, 6).

- To provide flexibility and choice to students in terms of subjects, entry and exit points, and credit transfer (6).
- To foster a strong research culture and innovation ecosystem in higher education institutions (6).
- To ensure quality, equity, access and affordability of higher education for all (6).

Challenges:

- To develop a robust and reliable assessment framework that can measure the learning outcomes of students across diverse disciplines and domains (7).
- To ensure the validity, reliability and comparability of assessments across different boards, agencies and institutions (7).
- To balance the autonomy and accountability of higher education institutions in terms of curriculum design, pedagogy, assessment and governance (7).
- To address the issues of academic integrity, plagiarism, cheating and malpractices in assessment (7).
- To leverage the potential of technology for enhancing the quality and efficiency of assessment, while ensuring its accessibility and equity for all students (7).

Accountability:

- The National Assessment Centre (PARAKH) will be established to set norms, standards and guidelines for student assessment and evaluation for all school boards and higher education institutions, and to monitor the achievement of learning outcomes (1, 6).
- The National Testing Agency (NTA) will conduct a common aptitude test and specialized common subject exams for admission to higher education institutions, which will be optional and not mandatory (6).
- The Higher Education Commission of India (HECI) will be a single regulator for higher education, with four independent verticals for regulation, accreditation, funding and academic standard setting (6).
- The National Accreditation Council (NAC) will be a meta-accrediting body that will accredit the accreditors for both public and private higher education institutions based on a transparent system of graded autonomy (6).

Benefits:

- The new assessment system will enable students to develop their competencies and skills, rather than memorize information for exams (1, 6).
- The new assessment system will provide feedback and guidance to students for improving their learning outcomes and achieving their goals (1, 6).
- The new assessment system will reduce the stress and anxiety associated with high-stakes exams, and encourage holistic development of students (1, 6).

- The new assessment system will create a level playing field for students from diverse backgrounds and regions, and ensure fair and transparent admission processes (6).
- The new assessment system will enhance the quality and relevance of higher education in India, and make it more responsive to the needs of the society and the economy (6).

2. The role of teachers in the new assessment system:

The role of teachers in the new assessment system is very important and crucial. According to the National Education Policy (NEP) 2020, teachers will have to:

Adopt active pedagogy, development of core capacities and life skills, experimental learning and low-stake board exams for their students (11).

Participate in regular and continuous professional development programs, both online and offline, to update their knowledge and skills (12).

Conduct regular and formative assessments for their students, using various methods such as quizzes, role plays, group work, portfolios, etc (10).

Provide feedback and guidance to their students for improving their learning outcomes and achieving their goals (10).

Use 360-degree holistic report cards to assess the holistic development of each child, including cognitive, affective and psychomotor domains (10).

Involve parents and peers in the assessment process, through interactive questionnaires, self-assessment and peer assessment (10).

Ensure academic integrity, plagiarism-free work and ethical conduct in assessment¹⁵.

Collaborate with other teachers in the school complex, which will be a hub for teacher recruitment, training and management (12).

3. The roles of technology in assessment:

Technology plays a vital role in the new assessment system envisioned by the National Education Policy (NEP) 2020. According to the policy document and other sources, some of the roles of technology in assessment are:

To enable regular and formative assessment of students using various online platforms and tools, such as quizzes, games, simulations, portfolios, etc (14, 15).

To provide feedback and guidance to students for improving their learning outcomes and achieving their goals, using artificial intelligence (AI) based software and adaptive learning systems (14, 15).

To conduct online assessments that are more flexible, reliable and valid, and that test the higher-order skills and competencies of students, such as analysis, critical thinking and conceptual clarity (14, 16, 17).

To ensure academic integrity, plagiarism-free work and ethical conduct in assessment, using digital tools for verification, authentication and proctoring (14, 18).

To create digital repositories and virtual labs for storing and accessing the assessment data and resources, and for conducting experiments and practicals (15, 17).

To facilitate the credit transfer and recognition of prior learning of students across different boards, agencies and institutions, using digital certificates and transcripts (14, 17).

To enhance the quality and efficiency of assessment, while ensuring its accessibility and equity for all students, especially those from disadvantaged groups and remote areas (14, 15, 17).

4. AI-based software used in assessment:

Gradescope: This is a tool that uses AI to help teachers grade and provide feedback to students' assignments, exams and projects. It can also analyze the students' performance and identify areas of improvement (19).

Fetchy: This is a tool that uses AI to help teachers create personalized and engaging learning content for their students. It can also generate quizzes, assessments and feedback based on the content (19).

Nuance's Dragon Speech Recognition: This is a tool that uses AI to transcribe speech to text, and vice versa. It can help students with disabilities, language learners and remote learners to access and produce educational content (19).

Ivy Chatbot: This is a tool that uses AI to provide 24/7 support and guidance to students through a conversational interface. It can answer common questions, provide information and resources, and connect students with human advisors (19).

Cognii: This is a tool that uses AI to provide natural language processing and feedback for open-ended questions and essays. It can assess the students' writing skills, comprehension and critical thinking (19).

Knowji: This is a tool that uses AI to help students learn vocabulary and pronunciation. It can adapt to the students' learning styles, preferences and progress, and provide personalized feedback and reinforcement (19).

Plaito: This is a tool that uses AI to help teachers monitor and improve the quality of their online courses. It can analyze the course content, design, delivery and engagement, and provide suggestions and best practices (19).

Queirum: This is a tool that uses AI to help students learn math and science through interactive simulations and games. It can also provide feedback, hints and explanations based on the students' actions (19).

These are just some of the examples of how AI can be used in assessment. There are many more tools and applications that use AI to enhance the learning and teaching experience (20, 21, 22, 23).

5. AI-based assessment tools:

AI-based assessment tools are applications or systems that use artificial intelligence (AI) to measure and evaluate the learning outcomes of students. Some of the challenges faced by AI-based assessment tools are:

Lack of transparency: AI-based assessment tools are not always clear about how they generate and score the results, which may raise questions about their validity, reliability and fairness (25, 26).

Data quality and bias: AI-based assessment tools rely on large amounts of data to train and test their algorithms, but the data may be incomplete, inaccurate, outdated or biased, which may affect the accuracy and equity of the assessment outcomes (25, 26, 27, 28, 29).

Ethical and legal issues: AI-based assessment tools may pose ethical and legal challenges, such as privacy, security, consent, accountability and ownership of the data and the results (25, 26, 28).

Technical and infrastructural issues: AI-based assessment tools may require high computational power, bandwidth and storage capacity, which may not be available or affordable for all users and contexts (25, 29, 30).

Human-AI interaction: AI-based assessment tools may require effective communication and collaboration between humans and machines, such as providing feedback, guidance and explanation to the users, and ensuring trust, acceptance and satisfaction of the users (25, 26, 27).

6. Benefits of AI-based assessment tools:

They can improve the precision and efficiency of assessment by analyzing large amounts of data and generating results faster than humans (31, 32).

They can provide feedback and guidance to students and teachers for improving their learning outcomes and teaching practices (31, 32).

They can enhance the quality and relevance of assessment by testing higher-order skills and competencies, such as analysis, critical thinking and conceptual clarity (31, 33).

They can ensure the fairness and equity of assessment by reducing human bias and providing access to diverse and inclusive content and resources (31, 32, 34).

They can foster innovation and creativity in assessment by using interactive and engaging methods, such as chatbots, simulations, games and images (31, 32).

7. The privacy and security of student data:

The privacy and security of student data in the new assessment system is a very important and challenging issue. According to the web search results, some of the ways to ensure the privacy and security of student data are:

Developing a clear and comprehensive policy and framework for student data privacy and protection, that defines the roles, responsibilities and rights of all stakeholders, such as students, teachers, parents, administrators and edtech providers (35, 36).

Educating and training all stakeholders on the best practices and guidelines for collecting, using, sharing and storing student data, such as using strong passwords, encryption, consent forms, data minimization and anonymization (35, 36, 37, 38).

Implementing and monitoring effective technical and administrative measures to prevent and respond to data breaches, such as firewalls, antivirus software, backups, audits and incident response plans (35, 36, 38).

Leveraging the potential of technology and artificial intelligence to enhance the quality and efficiency of assessment, while ensuring its accessibility and equity for all students, especially those from disadvantaged groups and remote areas (35, 36).

Collaborating and communicating with other stakeholders to create a culture of trust and transparency around student data privacy and security, and to address any issues or concerns that may arise (35, 36, 37).

8. Examples of student data that need to be protected:

Personally identifiable information (PII), such as name, birth date, phone, address, student ID, demographics, and login credentials (39, 42).

Academic records, such as grades, transcripts, test scores, attendance, and assignments (39, 42).

Behavioral and health data, such as disciplinary actions, counseling sessions, medical records, and special education needs (39, 42).

Online activity data, such as browsing history, email content, social media posts, and online proctoring results (40, 42).

Location data, such as GPS coordinates, Wi-Fi access points, and Bluetooth signals (40, 42).

These are just some of the examples of student data that need to be protected. There may be other types of data that are sensitive or confidential for students and their families. Therefore, it is important for schools to have clear and comprehensive policies and practices for collecting, using, sharing and storing student data (41, 42, 45).

9. Ethical issues related to student data protection:

How to balance the privacy and security of student data with the educational and research purposes of using it (44, 45, 46, 47, 48).

How to obtain informed and meaningful consent from students and parents for collecting, using, sharing and storing student data (44, 45, 46, 47, 48).

How to ensure the transparency and accountability of schools and third-party companies that access and process student data (44, 45, 46, 47, 48).

How to prevent and respond to data breaches, cyberattacks, identity theft and other risks that may compromise student data (44, 45, 46, 47, 48).

How to avoid or mitigate the potential harms and biases that may result from student data analysis, such as discrimination, stigmatization, profiling and manipulation (44, 45, 46, 48).

How to foster a culture of trust and respect among students, teachers, parents and other stakeholders regarding student data privacy and security (44, 45, 46).

10. Open educational resources (OER):

Open educational resources (OER) are educational materials that are freely available and openly licensed for anyone to use, adapt, and share¹. OER can play an important role in the new assessment system envisioned by the National Education Policy (NEP) 2020 in India, as they can:

Provide access and equity to high-quality and relevant learning materials for all students, especially those from disadvantaged groups and remote areas (49, 50).

Support the development and improvement of curricula, course design, teaching and learning methods, and assessment practices based on the latest advances and innovations in the field (49, 51).

Enable the flexibility and choice for students to select their subjects, entry and exit points, and credit transfer across different boards, agencies and institutions (50, 52).

Foster a culture of collaboration and sharing among teachers, students, researchers and other stakeholders to create, use, modify and distribute OER for educational purposes (51, 52, 53).

However, OER also pose some challenges and limitations for the new assessment system, such as: Ensuring the quality, validity, reliability and comparability of OER and their assessment outcomes across different sources and contexts (50, 52, 53).

Developing a clear and comprehensive policy and framework for OER creation, use, adaptation and distribution, that defines the roles, responsibilities and rights of all stakeholders (50, 52, 53).

Addressing the issues of academic integrity, plagiarism, cheating and malpractices in OER and their assessment (50, 52, 53).

Leveraging the potential of technology and artificial intelligence to enhance the quality and efficiency of OER and their assessment, while ensuring their accessibility and equity for all students (50, 52, 53).

11. Examples of OER used in school education:

Khan Academy: This is a platform that provides free online courses, lessons and practice for various subjects, such as math, science, arts, humanities and more (54).

BC campus: This is a platform that provides free open textbooks and other resources for various subjects, such as business, health, science, social sciences and more (55).

Cool 4 Ed: This is a platform that provides free online library for education, where teachers and students can find, adopt and review textbooks, course materials and other resources (56).

Library of Congress: This is a platform that provides free public domain works, such as books, maps, photos, audio and video files, that can be used for educational purposes (57).

Open Yale Courses: This is a platform that provides free access to lectures and course materials from Yale University on various subjects, such as literature, history, philosophy, psychology and more.

12. The quality and relevance of OER for assessment:

The quality and relevance of OER for assessment purposes are very important and challenging issues. According, some of the ways to ensure the quality and relevance of OER for assessment purposes are:

Developing and applying clear and comprehensive criteria and standards for evaluating the quality of OER, such as content accuracy, pedagogical design, technical functionality, accessibility, usability, and adaptability (58, 59, 60).

Using reliable and valid instruments and methods for measuring the quality of OER, such as rubrics, checklists, peer reviews, user feedback, and analytics (58, 59, 60).

Ensuring the alignment of OER with the learning outcomes, competencies, and skills that are expected from the students and that are relevant for their academic and professional development (58, 59, 60).

Updating and revising OER regularly to reflect the latest advances and innovations in the field, and to address the changing needs and expectations of the learners and teachers (58, 59, 60).

Providing guidance and support to the users of OER on how to select, use, adapt, and share OER for assessment purposes, such as through tutorials, examples, best practices, and communities of practice (58, 59, 60).

13. Ethical issues related to OER creation, use and distribution:

How to respect the intellectual property rights and moral rights of the original authors and creators of OER, and how to acknowledge their contributions and sources (62, 63, 64).

How to ensure the quality, accuracy, relevance and appropriateness of OER for different contexts, audiences and purposes, and how to evaluate and improve their effectiveness and impact (62, 63, 64).

How to balance the openness and accessibility of OER with the privacy and security of the users and their data, and how to prevent and respond to potential risks and harms, such as data breaches, cyberattacks, identity theft, plagiarism, cheating and malpractices (62, 63, 64).

How to promote the diversity, inclusion and equity of OER for all learners, especially those from disadvantaged groups and remote areas, and how to address the linguistic, cultural and educational barriers and challenges that may limit their access and participation (62, 63, 64).

How to foster a culture of collaboration, sharing and innovation among OER stakeholders, such as teachers, students, researchers, policymakers and edtech providers, and how to ensure their participation, engagement and empowerment in the OER movement (62, 63, 64).

14. Open Access (OA) publishing mode:

Open Access (OA) publishing is a mode of publishing that makes scholarly works freely available and accessible online, without any restrictions or fees for the readers¹. OA publishing can play a significant role in the new assessment system envisioned by the National Education Policy (NEP) 2020 in India, as it can:

Increase the visibility, reach and impact of Indian research, by making it accessible to a wider and more diverse audience, both nationally and internationally (66, 67).

Enhance the quality and relevance of Indian research, by facilitating peer review, feedback, collaboration and innovation among researchers, and by aligning with the latest advances and standards in the field (66, 67).

Support the development and improvement of curricula, course design, teaching and learning methods, and assessment practices, by providing access to high-quality and up-to-date educational resources, such as textbooks, journals, books, data and software (67, 68).

Enable the flexibility and choice for students and teachers to select their subjects, entry and exit points, and credit transfer across different boards, agencies and institutions, by providing a common platform for recognition and validation of their learning outcomes and achievements (67, 68).

Foster a culture of openness, transparency and accountability in Indian academia, by promoting ethical conduct, academic integrity, plagiarism-free work and citation practices among students and teachers (66, 67).

15. Examples of OA publishing in India:

OA Publishers: This is a company that provides OA publishing services for various disciplines, such as engineering, medicine, science, arts and humanities. It aims to promote the dissemination of scientific knowledge and innovation (70).

Scientometrics: This is a journal that publishes OA articles on the quantitative aspects of science, technology and innovation. It covers topics such as bibliometrics, scientometrics, informetrics, webometrics and altmetrics (72).

Open Access Journal of Medicinal and Aromatic Plants: This is a journal that publishes OA articles on the cultivation, processing, chemistry, pharmacology and uses of medicinal and aromatic plants. It is published by the Central Institute of Medicinal and Aromatic Plants.

Indian Journal of Open Learning: This is a journal that publishes OA articles on the theory and practice of open and distance learning. It is published by the Indira Gandhi National Open University.

Indian Academy of Sciences Conference Series: This is a journal that publishes OA articles on the proceedings of conferences organized or co-organized by the Indian Academy of Sciences. It covers various fields of science and technology.

16. Quality and relevance of OA publications assessment:

One of the ways to ensure the quality and relevance of OA publications for assessment purposes is to use reliable and valid instruments and methods for measuring the quality of OA publications, such as rubrics, checklists, peer reviews, user feedback, and analytics (75).

Another way is to ensure the alignment of OA publications with the learning outcomes, competencies, and skills that are expected from the students and that are relevant for their academic and professional development (75, 77).

A third way is to update and revise OA publications regularly to reflect the latest advances and innovations in the field, and to address the changing needs and expectations of the learners and teachers (75, 76).

A fourth way is to provide guidance and support to the users of OA publications on how to select, use, adapt, and share OA publications for assessment purposes, such as through tutorials, examples, best practices, and communities of practice (75, 76).

Conclusion:

The National Education Policy (NEP) 2020 aims to transform the assessment system for higher education institutions in India, by shifting from summative to formative assessment, by providing flexibility and choice to students, by fostering a strong research culture and innovation ecosystem, and by ensuring quality, equity, access and affordability of higher education for all. The new assessment system will also leverage the potential of technology and artificial intelligence, open educational resources and open access publishing, and student data protection to enhance the quality and efficiency of assessment, while ensuring its accessibility and equity for all students. The new assessment system will require the development of a robust and reliable assessment framework, the establishment of a single regulator and a meta-accrediting body, the creation of a culture of trust and transparency, and the provision of guidance and support to all stakeholders involved in the assessment process. The new assessment system will enable students to develop their competencies and skills, rather than memorize information for exams, and will provide feedback and guidance to students for improving their learning outcomes and achieving their goals. The new assessment system will also create a level playing field for students from diverse backgrounds and regions, and ensure fair and transparent admission processes. The new assessment system will ultimately enhance the quality and relevance of higher education in India, and make it more responsive to the needs of the society and the economy.

References:

- (1) NEP, 2020 ASSESSMENT REFORMS - Ministry of Education.
https://www.education.gov.in/shikshakparv/docs/Examination_and_Assessment_Reforms.pdf.
- (2) Press Information Bureau. <https://pib.gov.in/pressreleasepage.aspx?prid=1642049>.
- (3) Report on Assessment Reforms Date: 21 September 2020 (10.00 AM to 12.00
https://www.education.gov.in/shikshakparv/docs/Repertoire_Assessment_Reforms.pdf.
- (4) National Education Policy, 2020 - Ministry of Education.
https://www.education.gov.in/shikshakparv/docs/NEP_Assessments.pdf.
- (5) Table of Contents - CBSE.
[https://www.cbse.gov.in/cbsenew/documents//SAFAL%20Handbook%2027%20July%20202021.pdf](https://www.cbse.gov.in/cbsenew/documents//SAFAL%20Handbook%2027%20July%202021.pdf).
- (6) NEP 2020: School Examination & Assessment Reforms. <https://leadschool.in/school-owner/nep-2020/exams-and-assessment-reforms/>.
- (7) How NEP 2020 Changes the Nature of Exams and Assessment for Students?.
<https://www.iitms.co.in/blog/how-nep-2020-changes-the-nature-of-exams.html>.
- (8) Undefined. <http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd>.
- (9) NEP 2020 – Innovate India - MyGov.in. <https://innovateindia.mygov.in/nep2020/>.
- (10) School Teachers in NEP 2020 | The India Forum.
<https://www.theindiaforum.in/article/teachers-nep-2020>.
- (11) National Education Policy, 2020 - Ministry of Education.

- https://www.education.gov.in/shikshakparv/docs/NEP_Assessments.pdf.
- (12) NEP, 2020 ASSESSMENT REFORMS - Ministry of Education.
https://www.education.gov.in/shikshakparv/docs/Examination_and_Assessment_Reforms.pdf.
 - (13) NEP 2020: Empowering the teacher - Times of India.
<https://timesofindia.indiatimes.com/blogs/edutrends-india/nep-2020-empowering-the-teacher/>.
 - (14) NEP, 2020 ASSESSMENT REFORMS - Ministry of Education.
https://www.education.gov.in/shikshakparv/docs/Examination_and_Assessment_Reforms.pdf.
 - (15) National Education Policy, 2020 - Ministry of Education.
<https://www.education.gov.in/shikshakparv/docs/NCERT.pdf>.
 - (16) NEP 2020: An Interplay of Education And Technology | EducationAsia.
<https://educationasia.in/article/is-nep-2020-technologically-driven>.
 - (17) Technology in Education: Key Takeaways from NEP 2020 - Academia ERP.
<https://www.academiaerp.com/blog/technology-in-education-key-takeaways-from-nep-2020/>.
 - (18) “NEP 2020: of Teachers in Distance and Online Learning” Changing Role
http://ignou.ac.in/userfiles/09_%20Changing%20Role%20of%20Teachers_2426%20Mar%202022.pdf.
 - (19) Top 14 AI Assessment Tools For Hiring | Vervoe. <https://vervoe.com/ai-assessment-tools/>.
 - (20) Artificial Intelligence for Student Assessment: A Systematic Review - MDPI.
<https://www.mdpi.com/2076-3417/11/12/5467>.
 - (21) 10 Best AI Tools for Education (2023) - Unite.AI. <https://www.unite.ai/10-best-ai-tools-for-education/>.
 - (22) AI in Assessment | Aon's Assessment Solutions. <https://assessment.aon.com/en-us/blog/ai-in-assessment-8-questions-talent-professionals-must-answer>.
 - (23) Top AI Tools For Resume Screening - Analytics India Magazine.
<https://analyticsindiamag.com/top-ai-tools-for-resume-screening/>.
 - (24) Undefined. <https://doi.org/10.3390/app11125467>.
 - (25) The promise and challenges of AI - American Psychological Association (APA).
<https://www.apa.org/monitor/2021/11/cover-artificial-intelligence>.
 - (26) The Promises and Challenges of Artificial Intelligence for Teachers: a <https://link.springer.com/article/10.1007/s11528-022-00715-y>.
 - (27) Challenges in AI Testing – Webomates. <https://www.webomates.com/blog/artificial-intelligence/challenges-in-ai-testing/>.
 - (28) Artificial Intelligence Opportunities & Challenges in Businesses.
<https://towardsdatascience.com/artificial-intelligence-opportunities-challenges-in-businesses-e2e96ae935>.
 - (29) Artificial Intelligence: examples of ethical dilemmas | UNESCO.

- <https://www.unesco.org/en/artificial-intelligence/recommendation-ethics/cases>.
- (30) Common Challenges in Artificial Intelligence (AI) - 10xDS.
<https://10xds.com/blog/challenges-implementing-artificial-intelligence/>.
 - (31) AI in Assessment | Aon's Assessment Solutions. <https://assessment.aon.com/en-us/blog/ai-in-assessment-8-questions-talent-professionals-must-answer>.
 - (32) AI Tools in Teaching and Learning | Teaching Commons.
<https://teachingcommons.stanford.edu/news/ai-tools-teaching-and-learning>.
 - (33) Top 14 AI Assessment Tools For Hiring | Vervoe. <https://vervoe.com/ai-assessment-tools/>.
 - (34) Use of AI-based tools for healthcare purposes: a survey study from <https://bmcmmedinformdecismak.biomedcentral.com/articles/10.1186/s12911-020-01191-1>.
 - (35) Personal Data and Privacy Protection in Online Learning: Guidance for
<https://iite.unesco.org/publications/personal-data-and-privacy-protection-in-online-learning/>.
 - (36) Protecting Student Data Privacy | Edutopia. <https://www.edutopia.org/article/protecting-student-data-privacy>.
 - (37) The Educator's Role: Privacy, Confidentiality, and Security in the
<https://studentprivacycompass.org/scheid1/>.
 - (38) How to Protect Student Privacy | Today's Learner - Cengage.
<https://todayslearner.cengage.com/understanding-student-privacy-and-protecting-their-information/>.
 - (39) Ways to Protect Privacy When Using Student Data.
<https://campustechnology.com/articles/2021/03/24/11-ways-to-protect-privacy-when-using-student-data.aspx>.
 - (40) Protecting Student Data Privacy | Edutopia. <https://www.edutopia.org/article/protecting-student-data-privacy>.
 - (41) The Checklist: 5 Steps to Secure Student Data | EdTech Magazine.
<https://edtechmagazine.com/k12/article/2022/02/checklist-5-steps-secure-student-data>.
 - (42) How to Protect Student Privacy | Today's Learner - Cengage.
<https://todayslearner.cengage.com/understanding-student-privacy-and-protecting-their-information/>.
 - (43) Practical Safeguards to Protect Student Data.
<https://www.illuminateed.com/blog/2017/08/6-practical-safeguards-protect-student-data/>.
 - (44) Privacy and Paternalism: The Ethics of Student Data Collection. <https://thereader.mitpress.mit.edu/privacy-and-paternalism-the-ethics-of-student-data-collection/>.
 - (45) Ethical considerations in the use of student data: International https://www.2016conference.ascilite.org/wpcontent/uploads/ascilite2016_jonesh_concise.pdf.
 - (46) The Case for Including Data Privacy and Data Ethics in Educator
<https://studentprivacycompass.org/resource/case-data-privacy-ethics/>.
 - (47) Ethical and appropriate data use requires data literacy. <https://kappanonline.org/ethical-appropriate-data-use-requires-data-literacy-mandinach/>.

- (48) Ethical Issues Related to Data Privacy and Security: Why We Must - IEEE. <https://digitalprivacy.ieee.org/publications/topics/ethical-issues-related-to-data-privacy-and-security-why-we-must-balance-ethical-and-legal-requirements-in-the-connected-world>.
- (49) Open educational resources (OER) – Teaching in a Digital Age. <https://opentextbc.ca/teachinginadigitalage/chapter/oer/>.
- (50) Assessment of open educational resources (OER) developed in interactive <https://link.springer.com/article/10.1007/s10639-019-10081-7>.
- (51) Open Educational Resources | OER Africa. <https://www.oerafrica.org/12-open-educational-resources>.
- (52) Quality Evaluation of Open Educational Resources | SpringerLink. https://link.springer.com/chapter/10.1007/978-3-030-57717-9_36.
- (53) Open Education - 13. Open Assessment Resources for Deeper Learning.... <https://books.openedition.org/obp/3582>.
- (54) Open educational resources - Wikipedia. https://en.wikipedia.org/wiki/Open_educational_resources.
- (55) Open and Free Educational Resources (OER) For Teaching & Learning. <https://educationaltechnology.net/open-free-educational-resources-oer-teaching-learning/>.
- (56) How Can Educators Find and Use OER in Their Classrooms?. <https://www.thetechedvocate.org/how-can-educators-find-and-use-oer-in-their-classrooms/>.
- (57) Advantages of using OER in K-12 Education - Hurix Digital. <https://www.hurix.com/advantages-using-oer-k-12-education/>.
- (58) The 2019 UNESCO Recommendation on Open Educational Resources (OER) <https://unesdoc.unesco.org/ark:/48223/pf0000383205>.
- (59) Quality of OER: Test Theoretical Development and Validation - Springer. https://link.springer.com/chapter/10.1007/978-3-658-38703-7_8.
- (60) Quality of OER: Test Theoretical Development and - ResearchGate. https://www.researchgate.net/publication/368761640_Quality_of_OER_Test_Theoretical_Development_and_Validation_of_an_Assessment_Tool/fulltext/63f8ca35b1704f343f7c877f/Quality-of-OER-Test-Theoretical-Development-and-Validation-of-an-Assessment-Tool.pdf.
- (61) Undefined. <http://www.unesco.org/open-access/terms-use-ccbysa-en%29>.
- (62) Potential ethical problems in the creation of open educational <https://www.cell.com/heliyon/pdf/S2405-8440%2822%2900911-2.pdf>.
- (63) Recommendation on Open Educational Resources (OER) | UNESCO. <https://www.unesco.org/en/legal-affairs/recommendation-open-educational-resources-oer>.
- (64) Potential ethical problems in the creation of open educational https://www.academia.edu/99056588/Potential_ethical_problems_in_the_creation_of_open_educational_resources_through_virtual_spaces_in_academia.
- (65) Open access | Journals | Oxford Academic. <https://academic.oup.com/pages/open-research/open-access>.

- (66) Open access publishing in India: trends and policy perspectives. <https://www.emerald.com/insight/content/doi/10.1108/GKMC-09-2021-0158/full/html>.
- (67) Frankl | Towards an Author-Centered Open Access - Michigan Publishing. <https://journals.publishing.umich.edu/jep/article/id/3332/>.
- (68) Publishing Open Access - Cambridge University Press & Assessment. <https://www.cambridge.org/core/services/authors/journals/publishing-open-access>.
- (69) Oa Publishers. <https://oapublishers.org>.
- (70) Changing dynamics of scholarly publication: a perspective - Springer. <https://link.springer.com/article/10.1007/s11192-022-04375-w>.
- (71) <https://bing.com/search?q=OA+publishing+in+India>.
- (72) Open access publishing in India: trends and policy perspectives. <https://www.emerald.com/insight/content/doi/10.1108/GKMC-09-2021-0158/full/html>.
- (73) OA PUBLISHERS PRIVATE LIMITED - Indian Company & Director Details. <https://www.companydetails.in/company/oa-publishers-private-limited>.
- (74) Open Access Publishing and its Academic, Economic, and Societal - DRDO. <https://publications.drdo.gov.in/ojs/index.php/djlit/article/download/18621/7913/>.
- (75) Is the open access citation advantage real? A systematic review of the. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0253129>.
- (76) Models of Osteoarthritis: Relevance and New Insights. <https://link.springer.com/article/10.1007/s00223-020-00670-x>.
- (77) Organizational Assessment: A Tool to Improve Your Performance. <https://peopledynamics.co/organizational-assessment/>.
- (78) Undefined. <https://doi.org/10.1371/journal.pone.0253129>.



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Areas of Research:

1. Academic Performance and Text Anxiety in Indian Students.
2. Effects of Big Data Characteristics on Security – Leveraging Existing Security Mechanisms and Exploring New Techniques for Protection.
3. Voice call transfer service between Wi-Fi enabled Android Smartphone and Tablets without using internet.
4. Dynamic Navigation of Query Results based on concept hierarchies using improved Distance Rank Algorithm.
5. A Novel security for ATM framework by using digital image processing.
6. Understanding the Cognitive processes involved in technological entrepreneurial opportunity recognition.
7. A Novel Approach for Location based Services using Wireless Ad-hoc Networks (Manets).
8. Stenography to improve authentication using mobile phone as security Token.

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Areas of Research:

1. Academic Performance and Text Anxiety in Indian Students.
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- Aim of spreading quality education among children at the school & college level.
- Founder Secretary, Holy Mary Group of Institutions, Hyderabad & Nalanda Group of Institutions, Guntur, A.P.
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