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TRANSFORMING STUDENT ASSESSMENT WITH BIG DATA TOOLS AND TECHNIQUES IN THE FIELD OF HIGHER EDUCATION IN INDIA.

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Abstract:

Big data the word itself suggests that the data sets are exceptionally big and complicated in nature. A range of datasets are included in big data. It is challenging to process these data sets with conventional data processing methods. For example, the amount of student data in the education sector makes it very challenging to track student performance using traditional data processing techniques.

In India, millions of students graduate each year. India has now surpassed China in terms of population and is now the most populous country in the world. In addition to the population growth, the number of kids enrolling in school is rising annually. Because of the amount and velocity of the data sets, it is difficult to monitor student performance in the field of education.

Monitoring student performance is crucial for all educational establishments. Additionally, it is crucial that parents are aware of their child's academic progress. This can be facilitated by employing big data analytics as a tool to monitor student performance. Educational institutions can use big data analytics as a tool instead of heavily depending on traditional tools.

One of the hallmarks of big data is its enormous volume, which can be measured in petabytes or exabytes. The pace of the datasets, which is rising due to the expansion of sources like social media platforms, is another characteristic. The student performance datasets come in a variety of formats, including semi-structured, unstructured, and structured data.

Keywords: Traditional tools, education sector, students performance, data sets, big data, analytical tools.

Introduction:

The vast student data sets found in schools and universities have led to an increase in the usage of big data in the field of education. Its primary focus is on adaptive learning, which refers to the use of technology in the classroom to adapt to a constantly changing environment. Personalised learning strategies and individualised evaluations of student achievement are required in place of the conventional approach, which emphasises a one-size-fits-all

idea. Big data analytics is being used by several universities and schools to monitor student performance. The teacher can assess and determine the pupils' level of comprehension of a certain subject by using contemporary data collection techniques. Big data makes it easier to see trends in kids' comprehension levels. Virtual reality (VR) is a tool that allows teachers to monitor their students' performance when they participate digitally.

Uses of Big Data Tools and Techniques:

Big data tools and approaches are useful in a variety of higher education contexts, including flipped learning, online learning, blended learning, active learning, and remote learning. These forms of learning in higher education produce massive amounts of data for the learning management system (LMS). Teachers can upload study materials online utilising big data methods, and students can access these digital resources to help them learn and pass the tests included in the digital content. When students complete the assessments on the digital platform, the teacher can more readily determine which kids are at danger and which are engaged learners. In order for the teachers to reach out to and assist the pupils who are performing poorly. Involving slow learners in group discussions, quizzes, video views, and other activities also helps to provide them with more practice. Faculty members gain from data insights just as much as students do. Institutions are able to identify areas where pedagogical techniques need to be adjusted or where course materials may not be effective. In higher education, big data helps to provide light on both sides of the teaching-learning relationship.

Literature review:

BDA's is more useful in predicting academic outcomes, identify at- risk students, and improve the content delivery by personalized learning. BDA works by using the historical data like grades, demographics, and engagement metrics. Researches tries to explore empowering the teachers to use analytics.

'**Understanding digital transformation challenges for online learning and teaching in higher education institutions: a review and research framework (2025)' AUTHORS: SHALINI SAHNI, SUSHMA VERMA, RAHUL PRATAP SINGH KAURAV**.

The investigation revealed a lack of published work addressing the specific challenges faced by the faculty members affecting their well being. The study underscores the importance of e- learning technology adoption for higher education sustainability by compelling both students and teachers to rely heavily on social media platforms to maintain social presence and facilitate remote learning. The reduces interpersonal interaction during the pandemic has had negative consequences for academic engagement for both educators and students.

'A study on the impact of digital transformation on student empowerment in higher education of india' (2024) AUTHORS: DR. J SURESH KUMAR, DR. D SHOBANA

The study on the impact of digital transformation on student empowerment in higher education in India reveals a nuanced landscape. While digital initiatives have significantly expanded access to resources, fostered flexibility, and enhanced collaborative learning, challenges such as the digital divide, infrastructure limitations, and varying levels of digital literacy persist. To optimize the positive impacts and address challenges, focused efforts on digital inclusion, faculty development, quality assurance, and assessment innovations are crucial. A strategic and inclusive approach is essential for realizing the full potential of digital transformation to empower students and create a more equitable higher education environment in India.

'Big data analytics in education: transforming student learning and institutional practices' (2024) AUTHORS: DR. SUCHITRA LABHANE, DR. R INDUMATHY, KRISHNAMOORTHY PALANI, K. LAKSHMI

This paper is justified for several reasons. First, the integration of BDA into education is still evolving, with ongoing advancements in data collection, analysis, and application methods. A comprehensive review of current applications and trends in this domain is essential to map the progress and highlight areas requiring further research. Second, by examining the application of BDA in student learning, the paper will illuminate how

predictive analytics, machine learning algorithms, and real-time data can help identify learning gaps, forecast student success, and personalize instructional content.

Transforming assessment new pedagogies for the digital age (2016), SWATI JOHAR, UPDESH KUMAR

The investigation revealed Psychological assessment and intervention are extending and realigning from laboratory and clinical settings to our daily lives. Computers, mobile systems, and social media are no longer simple machines that convey information, but are symbols through which we perceive the real world in some way or another. In this interchange of psychological sciences and technology, various sources of progress can be predicted, and future challenges and development strategies must be formulated. This paper explores such challenges and focuses on the technical advances that can change the face of psychological assessment and devise an effective vision for the application of technology to assessment and feedback in this digital age.

Transformative e-learning in Indian higher education: empowering education for the new normal -- a Sem analysis. (2024) R., NAVEEN KUMAR; RAMADEVI, V.; JANANI M.; WILLIAM, A. JOHN; SARATHA, M. MEENAKSHI

The paper will underscore the escalating significance of elearning technology in education, particularly as it swiftly becomes the predominant paradigm in higher education. This research aims to investigate the evolving attitudes of students towards e-learning platforms. The authors investigate the blend of elearning and Information and Communication Technology (ICT) within Higher Education Institutions (HEIs) throughout India. Their research focuses on the impact of internet-based tools and information on the online learning journey, evaluating student satisfaction with the effectiveness of advanced teaching methods in enhancing knowledge. The study reveals that most students exhibit a favorable stance towards e-learning, with gender and frequency of online learning playing pivotal roles in shaping their perception.

Objectives:

- To identify the individual learning patterns, strengths and weaknesses of the students.
- To embrace the data-driven approach, technological upgrades, a cultural shift towards data literacy in the field of higher education.
- To ensure big data initiatives do not aggravate inequality in education, by eliminating the concept of digital divide.
- To adopt robust technological infrastructure and adequate resources for implementing and maintaining big data solutions in higher educational institutions.

Methodology:

The study includes the methods which are centered on educational data mining (EDM) and learning analytics (LA), drawing insights from wide range of structured and unstructured data. The study participants are students, educators, faculty members and administrators. There were 50 people included in the sample study. To obtain data, the convenience sampling method was employed. Pre-tested questionnaires were used as a data collection. Employing a 5-point Likert scale, where 1 signifies strong disagreement, 2 indicates disagreement, 3 represents neutrality, 4 denotes agreement, and 5 reflects strong agreement.. Meanwhile we have also used Secondary data collection method for obtaining data. The sources of secondary data are articles, abstracts, magazines and internet sources. Apart from this we have also conducted an observational study for the analysis.

1. Survey Design:

The questionnaire consists of 23 designed questions. The survey comprises the basic information of the respondents like name, age and their role in the field of higher education, it also includes the questions related to assessment methods that are currently being used i.e, traditional assessment and also what can be done to improve the assessment methods by utilising big data in higher education.

2. Observation:

During the observation period, the factors like for implementing the big data assessment tools in the field of higher education can be challenging to some institutions because its bit costlier for the institutions to adopt and also lack of faculties training can also a barrier for many universities, the faculties may not be aware of the big data tools and techniques. The other barrier is lack of infrastructure in the universities. All these factors seems to be challenging for the institutions to adopt big data tools and techniques.

1. Demographic Profile of Respondents:

1. Age: 92% of the respondents were aged between 20 to 30 years, while 8% were above 30 years of age.

2. Role in Higher Education: 74% of the respondents are students and remaining 26% of the respondents are faculty members and administrators.

3. Gender Distribution: 74% of the respondents are females and 26% are male respondents.

1. Key Factors Contributing to Attrition:

Technological Factors:

As the data are large in volumes which makes the educational institutions to collect and manage those data difficult and complex. The data which are inaccurate and incomplete can leads to false analysis and wrong decision making. Many Indian higher education institutions especially the small ones, have the lack of infrastructural facilities and resources to implement large scale big data analytics.

Organizational Factors:

Many educators, administrators are not even aware about the big data analytics, they are resistance to change for the data driven methods of assessment, accustomed to follow the old, traditional methods of teaching and assessment. At the same time for big data initiatives to succeed there must be strong support from the top management of the institution. Without the investment in technology, faculty training the big data initiatives cannot succeed.

Environmental Factors:

Digital divide, unequal access to technology and internet connectivity is one of the critical issue in India which may leads to students from rural or low-income households may be left behind in data-driven learning models. And the major issue is data privacy, collecting and managing the vast data is challenging for the educational institutions which leads the institutions to adopt it much costlier.

Recommendations

Recommendations Based on the findings of this study:

The following recommendations are proposed to Transforming student Assessment with Big Data Tools and techniques in the field of Higher Education in India.

Enhancing Learning through Data Analytics

- Shift from summative assessment method formative assessment methods like quizzes, self-assessment, concept mapping etc.
- Using predictive analysis to analyse the student performance and identifying the at risk students.

Strategic and institutional recommendations

- In compliance with India's Digital personal Data Protection Act, 2023 every educational institutions ensure to protect student privacy.

- Invest in appropriate big data platforms like Hadoop, spark or cloud-based solutions.

Implement Learning Management Systems (LMS)

- Utilizing the platforms like Moodle or Canvas which helps to track students behaviour, like time spent on course materials, participations in forums, quiz scores.
- Dashboards can provide insights to the educators about the student's learning journey, their strengths and weaknesses.

Trigger proactive support

- Automated alerts can be sent to counsellors or mentors about the performance of the student so that they can plan for tutorials.
- This helps the retention rates of the students in the particular university or in institutions.

Partner with data analytics firms

- Institutions can engage with local data analytics firms to develop custom solutions and it also saves the time and cost for the institutions.
- This will help to tailored the specific needs and improve the student performance.

Conclusion:

Institutions have the chance to go beyond traditional summative assessments by implementing big data technologies and methodologies. This makes it easier for educational institutions to evaluate students' performance using a more dynamic, individualised, and proactive approach. By measuring, comprehending, and enhancing the teaching-learning process, these changes promise to improve the quality of higher education in India. Through the identification of unique learning patterns and behaviours, big data analytics makes personalised learning possible. Conversely, predictive analysis assists in proactively identifying pupils who are at risk of dropping out or performing poorly.

Gathering information from several sources, such as extracurricular activities, internet participation, and academic success, offers a more comprehensive picture of students' development. This evaluation goes beyond simply assigning grades to gauge a student's performance; it also advances the student's overall development. It also encourages the acquisition of practical knowledge and critical thinking abilities. Institutions should concentrate on allocating resources as efficiently as possible and implementing innovative, contemporary teaching strategies by improving their curricula.

In the end, Indian higher education institutions can create a responsive, efficient, and adaptable learning environment by adopting big data and analytics. It ensures that evaluation turns into a potent instrument for student empowerment by assisting in navigating the difficulties of a contemporary, data-driven world.

References:

1. Shalini Sahni, Sushma Verma, Rahul Pratap Singh Kaurav Corresponding Author, Understanding digital transformation challenges for online learning and teaching in higher education institutions: a review and research framework Available to Purchase, An International Journal published on 15 May 2025 Volume 32, Issue 5 https://doi.org/10.1108/BIJ-04-2022-0245
2. Dr. J Suresh Kumar, Dr. D Shobana, A study on the impact of digital transformation on student empowerment in higher education of India, Published on 28 December 2023, Volume: 05, Issue: 01 https://doi.org/10.54660/.IJMRGE.2024.5.1.426-432
3. S Labhane, R Indumathy, MP Krishnamoorthy, Big data analytics in education: Transforming student learning and institutional practices, published on 2024, Volume 06, Issue 2, http://magellanes.com/
4. Swati Johar, Updesh Kumar, Transforming Assessment New Pedagogies for the Digital Age, published on 22 February 2016 https://doi.org/10.1002/9781119173489.ch29

5. R., Naveen Kumar; Ramadevi, V.; Janani M.; William, A. John; Saratha, M. Meenakshi, Transformative e-Learning in Indian Higher Education: Empowering Education for the New Normal -- A SEM Analysis. Published on 2024, Volume 25, Issue 1, DOI:10.51768/dbr.v25i1.251202407