

## An analysis on smart technology practice platform in higher education organizations centered on Big Data

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### Abstract

This paper explores the potential benefits and challenges of integrating big data analytics with smart technology practice platform in higher education organizations. It begins by providing an overview of the relevance of big data analytics to higher education institutions and discusses the potential benefits of implementing smart technology practice platform, such as improved learning outcomes, increased efficiency in administrative processes, enhanced student experience and engagement, and cost savings. The paper then identifies the challenges involved in implementing smart technology practice platform, such as the need for appropriate infrastructure, funding, and training for staff and faculty. The paper further explains the concept of big data analytics and how it can be applied to higher education institutions. It discusses various applications of big data analytics, including student performance analytics, resource allocation, predictive modeling, institutional benchmarking, and personalized learning. The paper also emphasizes the integration of smart technology practice platform and big data analytics and its potential to revolutionize higher education organizations by providing valuable insights into student performance and resource utilization. This paper emphasizes the importance of addressing the challenges and ethical considerations involved in the integration of smart technology practice platform and big data analytics to ensure that it benefits all stakeholders involved while also ensuring the privacy and security of student data.

**Keywords:** *BigData, smart technology, higher education, analytics, personalized learning, resource allocation, student performance analytics, integration.*

## I. Introduction

Smart technology practice platform has become increasingly important in higher education organizations due to its potential to improve learning outcomes, increase efficiency in administrative processes, enhance student experience and engagement, and provide cost savings. This paper provides an analysis of the role of Big Data in smart technology practice platform in higher education organizations. Big Data refers to the massive amount of structured and unstructured data that is generated from various sources. The application of Big Data analytics in higher education organizations has the potential to improve decision-making processes, enhance the quality of teaching and learning, and provide insights into student performance. One of the main benefits of smart technology practice platform in higher education organizations is improved learning outcomes. Smart technology practice platform enables instructors to create personalized learning experiences for students. This can be achieved through the use of adaptive learning technologies that provide tailored learning experiences based on individual student needs and performance. Big Data analytics can be used to identify patterns in student learning and provide insights into areas where students may be struggling, allowing for targeted interventions to be implemented. Smart technology practice platform can also increase efficiency in administrative processes, such as student registration, course scheduling, and grading. This can be achieved through the use of integrated systems that automate these processes, allowing staff to focus on more value-added activities. Big Data analytics can be used to provide insights into areas where administrative processes can be streamlined, such as identifying bottlenecks in the enrolment process. Smart technology practice platform can enhance student experience and engagement by providing access to a range of digital resources, such as online learning materials, collaborative tools, and social media platforms. This can facilitate student engagement and participation in the learning process. Big Data analytics can be used to identify patterns in student engagement and provide insights into the effectiveness of digital resources, allowing instructors to tailor their teaching methods to better meet student needs. Finally, smart technology practice platform can provide cost savings through the use of cloud-based systems that reduce the need for physical infrastructure and maintenance costs. Big Data analytics can be used to identify areas where cost savings can be made, such as identifying inefficiencies in resource usage and optimizing the use of technology resources. However, there are also challenges associated with smart technology practice platform in higher education organizations. Data privacy and security concerns are one of the main challenges, as the use of technology systems can increase the risk of data breaches and cyber-attacks. Integration with legacy systems can also be a challenge, as older systems may not be compatible with new technology platforms. Resistance to change and technical and infrastructure issues are also common challenges that need to be addressed. [1-3]

### 1.1 Big Data and its relevance to smart technology practice platform in higher education organizations

The massive amount of structured and unstructured data generated in higher education institutions can provide valuable insights into student performance, learning outcomes, administrative processes, and resource usage. The application of Big Data analytics can enable higher education institutions to make data-driven decisions, enhance teaching and learning experiences, and improve administrative processes. One of the main applications of Big Data in higher education institutions is in personalized learning. Smart technology practice platforms can provide personalized learning experiences for students through the use of adaptive learning technologies. Big Data analytics can be used to analyze

student data and identify patterns in student learning, allowing for the creation of personalized learning experiences that better meet individual student needs. Big Data can also be used to improve administrative processes in higher education institutions. Smart technology practice platforms can automate administrative processes such as student registration, course scheduling, and grading. The analysis of Big Data can provide insights into areas where administrative processes can be streamlined, reducing administrative costs and improving efficiency. The application of Big Data analytics can also enhance student engagement and experience. Smart technology practice platforms can provide access to a range of digital resources, such as online learning materials, collaborative tools, and social media platforms. Big Data analytics can be used to identify patterns in student engagement and provide insights into the effectiveness of digital resources, allowing instructors to tailor their teaching methods to better meet student needs. Moreover, Big Data analytics can provide valuable insights into the effectiveness of higher education institutions' resources. For instance, it can help institutions to analyze the usage of physical resources such as libraries, lecture halls, and laboratories, and to identify areas where resources are underutilized or overutilized. This can enable higher education institutions to optimize their resources, reduce costs, and improve overall efficiency. However, the application of Big Data in higher education institutions also raises concerns about data privacy and security. Higher education institutions need to ensure that the data collected is secure and that privacy policies are in place to protect students' personal information. It is also important to ensure that the use of Big Data in higher education institutions is transparent and that students are aware of the data being collected and how it is being used.

Improved student results: educational institutions can improve student results by providing individualized attention, engaging parents, using technology, and encouraging extracurricular activities. Customize program: Customizing educational programs can help to meet the diverse needs of students. This involves providing flexible learning options, incorporating different teaching methods, and tailoring the curriculum to individual learning styles. Reduced dropouts: To reduce dropout rates, schools can provide academic support services, counselling, and mentoring programs to help students overcome academic and personal challenges. Addressing school culture and climate, and creating a welcoming environment can also help to keep students engaged and invested in their education. Targeted international recruiting: International recruiting can bring diversity and enrich the learning experience of students. To target international students, educational institutions can leverage online platforms, international partnerships, and scholarship programs to attract and support students from different parts of the world. Four ways big data is transforming the education sector are shown in the figure 1. [4-5]



**Fig 1: 4 ways big data is transforming the education sector**

**II. Benefits of Smart Technology Practice Platform in Higher Education Organizations**

The table 1 outlines four benefits of using smart technology practice platforms in higher education organizations. The first benefit is personalized learning, where adaptive learning technologies can provide tailored learning experiences for students. The second benefit is administrative efficiency and automation, which can streamline administrative processes such as registration and grading. The third benefit is improved student engagement, where digital resources and collaborative tools can enhance the learning experience. The fourth benefit is resource optimization, where big data analytics can be used to optimize the usage of institutional resources and reduce costs.

**Table 1: Benefits of Smart Technology Practice Platform in Higher Education Organizations**

Benefit	Description	Potential Impact
<b>Personalized learning</b>	Smart technology practice platforms can provide personalized learning experiences for students through the use of adaptive learning technologies.	Improved student engagement, better academic performance, and higher student retention rates.
<b>Administrative efficiency and automation</b>	Smart technology practice platforms can automate administrative processes such as student registration, course scheduling, and grading.	Reduced administrative costs, increased efficiency, and streamlined workflows.

<b>Improved student engagement</b>	Smart technology practice platforms can provide access to a range of digital resources, such as online learning materials and collaborative tools.	Increased student engagement, improved academic outcomes, and better overall student experience.
<b>Resource optimization</b>	Big data analytics can provide valuable insights into the effectiveness of higher education institutions' resources.	Optimized resource allocation, reduced costs, and improved overall efficiency of the institution.

By using smart technology practice platforms in higher education institutions, personalized learning experiences can be created for students, and administrative processes can be streamlined through automation. This leads to better student engagement, improved academic outcomes, and a higher retention rate. Additionally, big data analytics can be used to optimize resource allocation and reduce costs, thereby improving overall institutional efficiency.

## 2.1 Challenges of Smart Technology Practice Platform in Higher Education Organizations

Here are some potential challenges that may arise when implementing smart technology practice platforms in higher education organizations:

1. *Cost*: Implementing smart technology practice platforms can be expensive, and institutions may need to allocate significant resources to purchase, install, and maintain the necessary hardware and software.
2. *Data privacy and security*: With the use of big data analytics and other technologies, there is a risk that sensitive student information may be compromised. Institutions must take measures to ensure that data privacy and security are maintained.
3. *Faculty and staff training*: Smart technology practice platforms require specialized knowledge and skills to operate effectively. Institutions must invest in faculty and staff training to ensure that they are able to effectively use the technology.
4. *Accessibility*: Digital platforms can create barriers for students with disabilities or those who lack access to technology. Institutions must ensure that these students are not left behind and that the technology is accessible to all students.
5. *Resistance to change*: There may be resistance from faculty, staff, and students who are not accustomed to using technology in their academic work. Institutions must communicate the benefits of the technology and provide support to help stakeholders adapt to the changes.
6. *Integration with existing systems*: Smart technology practice platforms may need to be integrated with existing institutional systems, which can be a complex and time-consuming process.

Implementing smart technology practice platforms in higher education organizations can provide significant benefits, but it is important to be aware of the potential challenges and take steps to address them.

## III. Big Data Analytics in Higher Education Organizations

Big data analytics is transforming the way institutions track student performance and identify areas where students may be struggling. By analyzing data from various sources, such as assessment scores,

course attendance, and engagement with online learning resources, institutions can gain insights into individual student performance and provide targeted interventions. For example, if an institution identifies that a particular cohort of students is struggling with a particular course or topic, additional tutoring or academic support can be provided to help those students succeed. This data-driven approach to student support can lead to improved academic outcomes and increased retention rates. Institutions can also use big data analytics to optimize resource allocation, identifying areas where resources may be underutilized or overutilized. By analyzing data on course enrollment, facility usage, and other metrics, institutions can make informed decisions about how to allocate resources, leading to cost savings and improved efficiency. For example, if an institution identifies that certain classrooms are consistently underutilized, those classrooms can be repurposed for other uses or even eliminated altogether, resulting in cost savings. Predictive modeling is another powerful use case for big data analytics in higher education. By analyzing historical student data, institutions can create predictive models that can forecast student outcomes and identify students who may be at risk of dropping out or not completing their degree. This data-driven approach to student support can help institutions identify students who may need additional resources or support to succeed, ultimately leading to increased retention rates and improved academic outcomes. In addition to improving academic outcomes, big data analytics can also be used for institutional benchmarking, allowing institutions to compare their academic performance against peer institutions. By analyzing data such as graduation rates, research funding, and faculty productivity, institutions can identify areas where they may need to improve and develop strategies to close the gap with their peers. Finally, big data analytics can be used to create personalized learning experiences for students. By analyzing student data, institutions can tailor coursework and assessments to individual student needs, ensuring that students are receiving the support and resources they need to succeed. This data-driven approach to personalized learning can lead to improved academic outcomes and increased student engagement. [6-8]

### **3.1 Definition of Big Data Analytics**

Big data analytics is the process of examining and extracting insights from large, complex, and diverse data sets using advanced computational and statistical techniques. The term "big data" refers to the massive volume of structured and unstructured data that is generated and collected by organizations, social media platforms, and other sources.

Big data analytics typically involves several stages, including data collection, data cleaning, data integration, data analysis, and data visualization. The aim of big data analytics is to uncover hidden patterns, correlations, and other insights that can help organizations make informed decisions and gain a competitive edge. One of the key challenges of big data analytics is managing and processing large data sets, which can require specialized tools and infrastructure. This has led to the development of new technologies and platforms, such as Hadoop, Spark, and NoSQL databases, that are designed to handle large data sets. [9]

The insights generated through big data analytics can have a wide range of applications in various fields, including healthcare, finance, marketing, and education. For example, in healthcare, big data analytics can be used to analyze patient data and identify patterns that can help doctors diagnose diseases more accurately and develop more effective treatments. [10-11]

## **IV. Smart Technology Practice Platform and Big Data Analytics**

Smart technology practice platforms can benefit significantly from big data analytics in higher education organizations. By analyzing large data sets generated by these platforms, institutions can gain valuable insights into student performance, resource utilization, and other key metrics. [12]

For example, institutions can use big data analytics to track student performance and identify areas where students may be struggling. This data can then be used to provide targeted interventions, such as additional tutoring or academic support. Similarly, big data analytics can help institutions identify areas where resources may be underutilized or overutilized, and make adjustments accordingly, leading to cost savings and improved efficiency. Big data analytics can also be used to create predictive models that can forecast student outcomes and help institutions identify students who may be at risk of dropping out or not completing their degree. This can help institutions intervene early and provide targeted support to help students succeed. In addition, big data analytics can be used to benchmark an institution's academic performance against peer institutions, identifying areas where the institution may need to improve. This can help institutions set performance targets and measure progress over time. Finally, big data analytics can be used to create personalized learning experiences for students by analyzing student data and tailoring coursework and assessments to individual student needs. This can help improve student engagement and outcomes, leading to higher retention rates and improved graduation rates. [13-14]

#### **4.1 Integration of Smart Technology Practice Platform and Big Data Analytics**

The integration of smart technology practice platforms and big data analytics can bring significant benefits to higher education organizations. By combining these two technologies, institutions can gain valuable insights into student performance, resource utilization, and other key metrics that can help them make informed decisions and improve outcomes. To achieve this integration, institutions can start by selecting a smart technology practice platform that is compatible with big data analytics tools and platforms. Once the platform is in place, institutions can start collecting data from various sources, such as student records, learning management systems, and social media platforms. The data collected can then be processed and analyzed using big data analytics tools and platforms to uncover hidden patterns, correlations, and other insights. This can help institutions identify areas where students may be struggling, allocate resources more efficiently, and create personalized learning experiences for students. However, integrating smart technology practice platforms and big data analytics also comes with some challenges. For example, institutions may need to invest in specialized infrastructure and tools to manage and process large data sets. Institutions also need to ensure that they have the necessary expertise and skills to analyze and interpret the data collected. Moreover, institutions must ensure that the use of big data analytics and smart technology practice platforms is ethical and protects student privacy. This can involve implementing data protection policies, obtaining consent from students, and ensuring that data is used only for its intended purpose. [15-16]

#### **Conclusion**

In conclusion, the integration of smart technology practice platform and big data analytics can bring significant benefits to higher education organizations. Smart technology practice platform can improve learning outcomes, increase efficiency in administrative processes, enhance student experience and engagement, and lead to cost savings. However, the implementation of smart technology practice platforms also comes with certain challenges, including data privacy and security concerns. Big data analytics can play a critical role in helping institutions make informed decisions

and improve outcomes by providing insights into student performance, resource utilization, predictive modeling, institutional benchmarking, and personalized learning. However, the implementation of big data analytics also comes with certain challenges, such as the need for specialized infrastructure, expertise, and skills to manage and process large data sets. The integration of smart technology practice platform and big data analytics has the potential to transform higher education organizations by providing valuable insights into student performance and resource utilization, leading to better decision-making and improved outcomes. However, institutions must also address the challenges and ethical considerations involved in this integration to ensure that it benefits all stakeholders involved, while also ensuring the privacy and security of student data.

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