# Big Data Analytics in Optimizing the Quality of Education: Challenges

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## Abstract

Today teaching learning methodology has significantly changed. With the new innovations in the field of information technology, our classrooms are becoming virtual, knowledge is on the cloud. Though education field has adopted these new technologies, it is still faced with the problem of improving the quality standard of education and diminishing dropout rates. This paper will review the big data analytics techniques that can be used in the education sector and what are the challenges that affecting the improvement in quality of education.

**Keywords: Teaching Learning Methodology, Big Data Analytics, Education, Knowledge, Cloud, Quality Standards**

## I. INTRODUCTION

Currently "big data" has become the buzzword in business, education sector, Health studies, statistics and many other fields [1]. "Big data" is the much-needed change agent in the education sector and it is going to ensure success for students, faculty and institutes [2].

Institutions of higher education are operating in an increasingly complex and competitive environment. They are under growing pressure to respond to national and global economic, political and social change such as the growing need to increase the proportion of students in certain disciplines, embedding workplace graduate attributes and ensuring that the quality standard of learning programmes are both nationally and globally relevant[3].

To overcome from this critical situation and to improve the quality of their teaching learning methods the institutions are becoming dependent on the emerging technology called "Big Data Analytics".

Big Data Analytics is the process of reviewing available data to gain insight using software tools and techniques. It will help the institution in taking right decision according to situation. So, academicians are now hardly tries to implement the big data analytics in their institution to find the strength and weakness of both the students and institution and to relate with other institution [4].

This paper reviews various Analytical techniques applicable at Education industry and some of the major disputes faced by institution in implementing these analytic methods.

## II. LITERATURE SURVEY

Many institutes and universities have indicated that analytics can help significantly advance to an institution in such strategic areas as proper resource allocation & utilization, student success, and finance. Higher education leaders hear about these massive transformations occurring at other institutions and wonder how their institutions can initiate or build upon their own analytics programs. Analytics is used mostly in the areas of enrollment management, student progress, and institutional economy and budgeting. The potential benefits of analytics in addressing other areas—such as cost to complete a degree, resource optimization, and various administrative task—have not been realized[5].

Large online portals like Pearson, Blackboard, Desire2learn and Coursera have leveraged analytics to optimize their solution and grow their business. By the simple tracking mechanisms on number of logins, amount spent on teaching resources, no of post, discussion on forums etc. and decode these numbers to create meaningful dashboards enables teachers to better assess the progress report of individual students and also help to personalize learning requirements as per the need of the students[2].

A new generation of tools, such as SNAPP, uses data to analyze social networks, degrees of connectivity, and peripheral learners. Discourse analysis tools, such as those being developed at the Knowledge Media Institute at the Open University, UK, are also effective at assessing the qualitative attributes of discourse and discussions and rate each learner's contributions by depth and substance in relation to the topic of discussion. Also at Athabasca University, social networks can provide valuable insight into how connected learners are to each other and to the university [6].

## III. BIG DATA ANALYTICS IN THE CONTEXT OF EDUCATION

Big data analytics is the technique of gathering, organizing and analyzing large data sets to patterns and other useful information. Big data analytics will help institution to better understand the information contained within the data and will also identify the data that is most essential to the business and future decisions [8].

With reference to education, Big Data connotes the interpretation of a wide range of administrative and operational data collecting procedures aimed at assessing institutional pursuance and progress in order to predict future performance and reveal potential issues related to academic progress, research, teaching and learning methods. In addition to this, Big Data Analytics could be applied to examine student entry on a course assessment, discussion board entries, blog entries or wiki activity, which could generate thousands of transactions per student per course. These data would be collected in real or near real time as it is transacted and then analyzed to suggest courses of action [7].

## IV. BIG DATA ANALYTICS TECHNIQUES

Big Data Analytics is the method of developing actionable insights through problem definition and the application of statistical models and analysis against existing and/or simulated future data [10].

When considering analytics within the domain of education it is also useful to consider how these techniques are being applied within the context of the institution. Buckingham Shum (2012) has introduced the concept of three levels of learning analytics:

- Macro level analytics enable data sharing across institutions for a range of purposes including benchmarking.
- Meso level analytics work at the level of individual institutions, and include analytics based on business intelligence approaches.
- Micro level analytics support the tracking and interpretation of process-level data for individual learners [10].

Some other popular techniques of analytics in education sector are as below:

The analytics in education sector can be divided into two broader categories: learning analytics (LA) and academic analytics [9]

### *A. Learning Analytics*

Big Data incorporates the emergent research field of learning analytics, which is already a growing area in education. However, research in learning analytics has largely been limited to examining indicators of individual student and class performance [7].

Learning analytics applies techniques from information science, sociology, psychology, statistics, machine learning and data mining to analyze data collected during education administration and services, teaching and learning. Learning analytics creates applications that directly influence educational practice [10].

### *B. Academic Analytics*

Academic analytics provides overall information about what is happening in a specific programme and how to address performance challenges. Academic analytics reflects the role of data analysis at an institutional level, whereas learning analytics centers on the learning process [7].

Academic analytics is concerned with the improvement of resources, processes and workflows of the academic institution through the use of learner, academic, and institutional data [11].

The goal of an academic analytics programme is also to help those charged with strategic planning in a learning environment to measure, collect, interpret, report and share data in an effective manner so that operational activities related to academic programming and student strengths and weaknesses can be identified and appropriately rectified[7].

## V. CHALLENGES IN OPTIMIZING QUALITY OF EDUCATION

Though analytics provides better decision making capability and environment at education sector, it faced with some unmanageable challenges. These challenges are creating obstacles in the way of progress of the institution. The challenges are:

### *A. Data Collection, Storage and Management*

Collecting data for analysis is been a major problem for the execution of educational analytics. It is tough to access needed information from weakly integrated DBMS. Besides this, poor quality and incorrectly formatted data and information from rare accessible database system can cause significant problems.

### *B. Data Privacy & Protection*

The Institutional data is confidential. Hence, these data needs to be protected from unauthorized access. The entire stakeholder needs to maintain essential security of their own data and who may access information about their knowledge or competencies.

### C. *Converting Ideas into Model*

It would be difficult for the students and teachers to represent their ideas in form of information in an accessible and informative way to the system and hence would be inflexible to cooperate with the system.

### D. *Capability to Maintain Learning Analytics System*

The vital element of Learning Analytics System is the knowledge & ability to use it effectively. The Faculties & Students must aware about its functioning and maintenance. So, they can work with it effectively in align with the system flow.

### E. *Error Correction in Analytics*

With the adoption of learning analytics system, there is a chance of occurring error in analytics generated by the system. The analytical error is difficult to find out and it may lead to incorrect decision i critical situation.

## VI. CONCLUSION

There is no doubt in the fact that analytics bring massive improvement in the quality of education but considering all things educational institutions needs to begin to the use of analytics. Despite of the above mentioned challenges education institute can get the advantage but they have to be careful in balancing the automation and analytical tools as analytical tools on one side and human feeling on the other. Hence, institution needs to design a way that compliments the combination of analytical tools & human.

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