

On the Fusion of Big Data in Higher Education

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Abstract: The fusion of big data with higher education has promoted the educational reforms and the advances of educational digitalization by providing technological, environmental and notional supports. Due to a variety of factors at the same time, the application of big data theory has been caught in some problems: low efficiency in utilization, insufficient uses, serious waste of resources, and lower digitalization. This essay attempts to provide some approaches on the basis of the phenomena and factor analysis of the problems with big data application to higher education.

1. Introduction

With the quick development of IT and internet, the technologies of cloud calculation, webs of things and big data system have all sprung up and promoted the digitalization of education. The fusion of big data theory with higher education in particular, by making use of the accumulated valuable mass data, has introduced new methods of research and notions into the field and accelerated the reform of education. Due to a variety of factors, there are still some problems unsolved in this fusion. Examining these problems and factors can better bring the role of big data into full play and enhance further digitalization of higher education.

2. The impact of big data on the reform of higher education

2.1 Providing technological supports for sharing the best global educational resources

This worldwide resource sharing has helped individualized learning and improved education equality. Mooc, supported by big data system, allows individuals to flexibly select and schedule their learning activities with minimal limits on learners, the ways of learning and the environment.

2.2 Providing environmental supports for the further fusion between IT and higher education

The digitalized educational environment with big data is based on the high integration of data and information,

which has revolutionized all the elements in the traditional education and deeply changed a series of sections including the teaching tools, content of courses and methods, boosting the openness, universality and sustainable development of higher education.

2.3 Providing the practice of higher education with new thinking and ideas

Empirical study and quantification is the core of big data theory, which has provided new ideas and thinking for higher education and improved its validity. No matter in teaching, scientific researches or management, big data technology can provide incomparably accurate and objective information in contrast with the traditional ways of teaching, and boost the creativity in the practice of higher education.

3. Problems with the fusion between big data and higher education

3.1 Low efficiency in utilization

In terms of big data used in the practice of higher education, the areas and orientation of objects where big data is used are comparatively narrow, much of the utilization is only specific with particular teaching purposes, neglecting the gathering of data in the learning process. This type of big data use limited to some narrow areas has fragmented all the information concerned, which limits the analysis of the whole learning process for modeling. In the utilization of big data systems like Mooc, many institutes of higher learning are not qualified as data analysts or processors because they are unable to handle the produced data and inefficient in applying the data to the practice of higher education.

3.2 Insufficient uses and much waste

Theoretically, the personnel training modes in higher education can be scientifically adjusted according to social feedbacks collected through big data system, while in fact, the institutes have not paid enough attention to big data resources and are not clear what kinds of personnel are socially needed, and the utilization of the data is insufficient in both the research and conversion of scientific achievements into social service, so the extension and progress in the integration of the big data system is confronted with much difficulty, for example, libraries in the institutes are an important area where big data is used, but every institute regards itself as an independent individual constructing the library which will not be open to the outside, bringing about much waste of the resources. In summary, the imperfect and unsystematic construction of the big data has been much restricted in utilization.

3.3 Lower digitalization

Low digitalization can be illustrated with the construction of digital libraries. Although widely supported by both the institutes and academic community, due to the limitations of management system, resource conditions and techniques, the exploration in data collection, storage and analysis has not achieved much. Besides, the digitalization and quantification of cultural symbols, a complex system itself, is still faced with much technical and non-technical difficulty, the solution involves the investment of much manpower, finances and material resources. In short, the digitalization based on big data in these institutes is considerably low, there are still many problems to be solved in the top-level design in the digitalization in the institutes of higher learning.

3.4 Immaturity with the big data system

The big data system is still in its primary stage of development. Its imperfection and higher technical requirements have much restricted its application in higher education. The information system of scientific research in these institutes is mostly that of management and accordingly does not show anything about the research process involved in the specific research programs, hence the fragmented data and lower sharing. This kind of phenomena has much restricted the data-based researches. To sum up, the problems with the big data system and poor ability to use the system have placed the use of big data in a dilemma, some people have even begun to question the roles of big data.

4. Factor analysis of the problems

4.1 On cognitive level

4.1.1 The resisting attitudes towards big data

The application of big data in higher education involves the termination of traditional teaching patterns and the construction of new teaching styles, structures and research methods. This means that teachers must transform their development from traditional thinking to new skills which may be painful. Meanwhile, the big data construction involves much investment. These two poses resistance to the application of big data in higher education.

4.1.2 Poor understanding of the roles and value of big data

Although the impacts and value of big data in higher education have been widely identified, the theory, due to

the dynamic nature of its development and research, has invited some questioning and criticizing. Some people believe that big data as a technical tool can only reveal some phenomena and related facts but cannot provide any concerned explanation. Others argue that there is an uncertainty with the use of big data, leading to some dead zones of research and the disclosure of some privacy.

4.2 On applicative level

4.2.1 The inability for hardware and software to provide the required matching data support

The present information construction in terms of hardware and software in the institutes cannot meet the demands of big data, lacking the information of on-spot teaching and campus environment, which cannot be solved with the present information system and data collection devices. Although there is data accumulated, the present hardware cannot meet the needs to store the mounting data and software is very limited in packing capacity, unable to optimize or store the mounting size of non-structural and semi-structural data.

4.2.2 Shortage of personnel in data application and management

The quality of application and management personnel determines the effect of big data application in higher education. The lack of these types of qualified personnel has limited the effectiveness of role playing of data application in the institutes of higher learning.

5. Approaches to fuse big data with higher education development

5.1 To deepen the understanding of big data theory

5.1.1 Treating big data with broad-mindedness and strategic insight

Big data technology as a creativity of IT is regarded as the spur to the 3rd industrial revolution. Therefore, we should be broadminded and have strategic insight about its spurring role in higher education, lose no time to grasp the opportunity to promote the construction of digitalized education, accelerate the transformation from traditional to modern concepts of teaching and facilitate the improvement of teaching in order to ultimately create the best learning environment based on equality and fairness for the benign interaction and circulation among technology, society and education.

5.1.2 Comprehensively understanding the roles and value of big data

Big data can play important roles in helping people to survey what is in the past, understand what is present and predict the future. But the technology as a tool or means cannot be applied in everything. Therefore, in the

field of higher education, the institutes should have selective application in different areas so that the spurring role of big data can be brought into full play.

5.1.3 Promoting data-based development with dialectical thinking

The dialectical examination of the role of big data in higher education can help reveal both the advantages and disadvantages of technology. As a new thing, big data is still in its primary stage of spiral development. The cyclic process of denial, re-examination and confirmation of the technology can further push forward its development.

5.2 To construct the integration where the big data can be applied

5.2.1 Integrating data resources for the facility of application

The integration of data resources in institutes of higher learning means to construct a large big data platform where the systems of storage, collection, transmission and analysis are all combined, which can provide sufficient data support for management and decision making in optimizing resource distribution, and give full play to big data in scientific research, personnel training and management, social service and cultural inheritance.

5.2.2 Improving the efficacy of big data

The collection, storage and analysis of data in the technology cannot effectively meet the needs in higher education. Besides, the cost and energy consumption in application are also fairly high. For higher efficacy of big data application in education, the follow needs must be met: 1) to reduce redundancy and noise of the big data for better cleanout and to smaller scales, 2) to develop more efficient patterns with lower costs to deal with data integration and storage, 3) to improve the timeliness and efficiency of data analysis, and 4) to develop transplantable and widely usable data processing systems to meet people's real time needs.

5.3 To optimize the resource distribution and improve efficiency of big data application

5.3.1 To comprehensively update the hardware and software for big data use

For the settlement of lacking the collection of procedure-oriented data in higher education, the following can be suggested: 1) to introduce the technology of the web of things into the updating of the data platform in the institutes, particularly radio frequency identification, sensor technology, flush and laser scanning, all these can greatly contribute to data collection and processing of the platform, 2) to update the network layout and

devices for quicker speed of data transmission, and 3) to introduce distributed data storage and analysis systems with larger capacity and better calculation.

5.3.2 To foster creativity in big data culture

As a tool, big data must be put under the control of human beings. The institutes of higher learning as cultural inheritors should construct the culture of big data application by integrating instrument and value rationalities to eliminate the irrationality in the application. The nature of education means that the institutes should play the dominant role in the construction and progress of theoretical systems of big data culture, therefore, they should, in the spirit of fairness, legitimacy, responsibility and publicity, convert the ethic norms concerning big data uses into rulers of conduct.

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