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ENHANCING TEACHING AND LEARNING THOUGH DIGITAL DATA AND LEARNING ANALYTICS IN EDUCATION

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Abstract

Informational Communication Technology (ICT) increasing digital eLearning and teaching practices as well as how the educators handling their administrative work. Students and teachers are large amount of digital data and information and trace in various educational application and learning management platforms and educational administrator systems. In such a background in recent years have been emergency of fast growing and multi-disciplinary field of learning analytics. Institutional database and virtual learning environment (also known as learning management system). The rise of big data in education is accompanied by an increase in take-up of online and blended teaching and learning, and by growth in the numbers of learner worldwide learning informally using open educational resources (OERs) massive open online courses (MOOCs). There is therefore a world interest in ways optimizing learning in theses settings.

In this paper, we examine the research efforts that have been conducted in the field of learning analytics in IIS Jubail as eLearning research projects and developed research strands with selected classes from KG to 5. The main conclusion of this paper is to adoption of strategies for learning analytics.

Keywords— *OERs, MOOCs, KG–Kindergarten, ICT-Information Communication Technology, Education.*

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1. Introduction

Over the past two decades, the world has undergone a transformation process, which, many consider to be as important as the industrial once. This society also called the information ad knowledge and knowledge, information technology plays a crucial role. As a consequences of the digitization, huge quantities of data, i.e. big data, is generated that reflected our activities.

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Therefore, in many fields, such as business or medicine, we have witnessed now essential the use of analytics has become to process generated big data in order to develop date-driven insight into people's activities of optimization of processes and output. Today educational system around the world are also undergoing major digital transformations. Information and communication technologies are increasing mediating learning and teaching as well as educational institution are handling their administrative work. As such, students and teachers are leaning large amount of digital footprints and traces in various educational application and learning management platforms and educational administrators registers various process and outcomes in digital administrative systems. In the recent years a increasing the growth of multi-disciplinary field of learning analytics. The filed, which originate from disciplines such as business intelligence, web analytics, educational data mining and recommender system attempts to exploit data generated in educational settings for purpose of understanding and optimizing learning and environment in which it occurs.

Online Learning Systems and Adaptive Learning Environments Online learning systems refer to online courses or to learning software or interactive learning environments that use intelligent tutoring systems, virtual labs, or simulations. Online courses may be offered through a learning or course management system (such as Blackboard, Moodle, or Sakai). Examples of learning software and interactive learning environments are those from Kaplan, Khan Academy, and Agile Mind. When online learning systems use data to change in response to student performance, they become adaptive learning environments.

This issue brief describes data analytics and data mining in the commercial world and how similar techniques (learner analytics and educational data mining) are starting to be applied in education. The brief examines the challenges being encountered and the potential of such efforts for improving student outcomes and the productivity of K–12 education systems. The goal is to help education policymakers and administrators understand how data mining and analytics work and how they can be applied within online learning systems to support education-related decision-making.

Specifically, this issue brief addresses the following questions:

- What is educational data mining, and how is it applied? What kinds of questions can it answer, and what kinds of data are needed to answer these questions?
- How does learning analytics differ from data mining? Does it answer different questions and use different data?

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- What are the broad application areas for which educational data mining and learning analytics are used?
- What are the benefits of educational data mining and learning analytics, and what factors have enabled these new approaches to be adopted?
- What are the challenges and barriers to successful application of educational data mining and learning analytics?
- What new practices have to be adopted in order to successfully employ educational data mining and learning analytics for improving teaching and learning?

2. Learning analytics features

2.1 Learning Analytics Learning analytics use static and dynamic information about learners and learning environments, assessing, eliciting and analyzing them, for real-time modeling, prediction, and optimization of learning processes, learning environments, and educational decision-making (Ifenthaler, 2015). Learning analytics provide benefits for all levels of education stakeholders: mega-level (governance), macro-level (institution), meso-level (curriculum, teacher/tutor) and micro-level (learner) (Ifenthaler & Widanapathirana, 2014). The micro-level of learning analytics focusses on supporting individual and collaborative learning activities. Benefits can be divided in three perspectives and for the micro-level as follows (Ifenthaler & Widanapathirana, 2014):

a) **Summative:** understand learning habits, compare learning paths, analyze learning outcomes, track progress towards goals;
b) **Real-time:** receive automated interventions and scaffolds, take assessments including just-in-time feedback, support collaboration;
c) **Predictive:** optimize learning paths, adapt to recommendations, increase engagement, increase success rates.

2.2 Learning Analytics Features learning analytics features include functions a learning analytics system could provide to the user (e.g., learners, tutors, administrators, etc.). Thus, learning analytics features include dashboard elements, for example visualizations of activity analyses in the learning management system. Further, features include recommendations about further readings, self-assessment-questionnaires, or additional links to related video tutorials. Features focusing on learners' behavior include time spent online, analyses and forecasts of academic performance, adaptive learning recommendations, and personalized prompts with questions about the learners' dispositions. Learning analytics features rely on analyses of various data (Ifenthaler & Widanapathirana, 2014):

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a) Learner characteristics including prior knowledge, psychometric tests about learning strategies and competencies, socio-demographic data, or prior academic performance.
b) External data such as searches in the library catalogue, geo-data or information from social media.
c) Traces generated by using the online learning environment, for example online-frequency and -time, activities in discussions and other online interaction, results of self-assessment-questionnaires, up- and download of resources, as well as ratings of content. Furthermore,
d) Curricular information are integrated into the analyses, for instance exemplar study paths and expected learning outcomes. Many dashboard applications in learning analytics systems focus on visualizations of descriptive data, such as time spent online, the progress towards the completion of a course, or comparisons with other students' performance. More elaborated systems include results of self-assessments (Verbert et al., 2014). Findings of a comparative study of three learning analytics systems have shown that students prefer more detailed learning analytics systems with elaborated analyses and personalized recommendations for their learning (Ifenthaler & Schumacher, 2015). Learning analytics systems showing descriptive summative information about past learning activities such as time spent online, login frequency, and performance results already help students to monitor their current state and increase student success rates. However, to plan upcoming learning activities or to adapt current learning strategies, further personalized and adaptive features of the learning analytics system are needed.

3. Conclusion

In this paper, we design and examine the research efforts to have been conducted in the field of learning analytics in international Indian school Jubail as eLearning research projects and developed research strands with selected classes from KG to 5. We address issues on user privacy by proposing the use of LMS internal UUID to anonymously collect and analyze learner behavior while using research systems. The visualization of outcome and actionable results from the research can then be viewed that resides within the production LMS system. Real identities based on the user's role within the LMS system. An advantage of proposed system is that the data collected by the system does not contain information that can directly identify students, it allows the data to be openly analyzed within the connected research systems. In future we can plan to allow students of courses, such as learning analytics and data

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mining to analyze the real data collected by the proposed system. This will help in the development of education of these fields, and encourage students to pursue further research and analysis of their own learning behavior. In future we will complete the implementation of the system and evaluate its effectiveness in meeting the need of the stockholder's students, teaching staff and researchers.

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