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Bichsel (2013) probed the present day advantage of using analytics in higher education. It was found that data is mainly used for keeping track of enrolment management, finance and budgeting, and student advancement. Parallel with this use, the crucial perceived advantage established on forecast from the data were describe as understanding student demographics and behaviors, optimizing the use of resources, engage behaviors, optimizing the use of resources, engage students and assisting students learn more conclusively. In the same report, reduced, misapplied of data, rules viewing the use of data and lack of knowledge about the use of data in making decisions are stated as treat about the development use of analytics in higher education. Bichsel (2013) also investigated as a key discovery that institutions, which are more active in the process of investment, cultural change, reporting tools, expertise and infrastructure, are awaited to use data to make predictions or projections in various areas.

Likewise, Brown (2013) attempted to provide some empirical approach established on concepts. The researcher mostly emphasized on student advancement and underlined the importance of data that should be used as predictors and indicators of student advancement. Brown (2013) firstly, mentioned learning factors like age, gender, ethnicity, current grade point average (GPA) and previous learning practices that occurs before the course begins and offer some sign of how a student is willing to prepare for their own learning process. After that, activity and performance indictors like the number and amount of learning management system logins, the amount of time spent on the course website, the number of discussion forum messages, grades, and formative quiz scores, were mentioned by the researcher as these measures are digital fingerprints of learners as they proceed through the learning process.

Learning analytics unite expertise from different academic disciplines such as educational data mining and predictive modelling. Academic analytics is now considered as being more agitated with points of institutional business such as recruitment, and less associated to instruction itself. The society for learning analytics research (SoLAR) was established in 2013 and adopted as the most often-quoted definition of learning analytics:

> "Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs (Siemens & Gasevic, 2012)."

Learning analytics is an educational application of web analytics, a science that is commonly used by businesses to analyze commercial activities, identify spending trends, and predict consumer behavior. Education is embarking on a similar pursuit into data science with the aim of learner profiling, a process of gathering and analyzing large amounts of detail about individual student interactions in online learning activities. The goal is to build better pedagogies, empower students to take an active part in learning, target at-risk student's population, and assess factors affecting completion and student's success. For learners, educators, and researchers, learning analytics is already starting to provide crucial insights into student's progress and interaction with online texts, courseware, and learning environments used to deliver instruction. Students are beginning to experience the benefits of learning analytics as they engage with mobile and online platforms that track data to create responsive, personalized learning experiences.

Aim and Objectives

The study is to examine learning analytics and its benefits for educational purposes. Specifically, the study intends to:

1. Explain the concept and benefits of learning analytics
2. Describe the framework of learning analytics
3. Examine the levels of learning analytics

Discussion

Concept and benefits of Learning Analytics

Learning analytics can be powerful in giving meaning to interactions and actions in a learning environment, allowing one to eventually personalize every learning environment based on the student's preference and progress. It will also help teachers predict student's satisfaction before the class is over. A major aspect of Instructional design and e-Learning development is to know the behavior of one's learner. Learning analytics are in essence, the collection of data that is gathered while learners are engaging in the e-Learning experience. Analytics also consist of the analysis and reporting of Information. Specifically, concerning e-Learning, vital pieces of data are recorded throughout the duration of the e-Learning course such as learners' score on a particular

test/exam, how quickly they are progressing through a module, how many times have they have logged in, whether they have participated in a discussion board. At the same time, Learning Analytics also offer online facilitators and instructors a comprehensive look at how a learner is performing, if he/she may need additional help with a particular lesson or subject, and even if the learner is likely to pass or not an e-Learning course. Such data can then be used to make educational analysis and predictions that help to determine which learning materials are appropriate, useful or irrelevant for the learners. This is primarily based upon learner's performance, skill level, and personal interests.

Learning analytics hold the promise of improving learning efficiency and effectiveness in primary, secondary, and post- secondary education. Learning analytics are directed towards providing educators, learners, and administrators with actionable insight to classroom and course level activities.

The benefits of learning analytics in Education include:

1.Through careful analysis of big data, researchers can determine useful information that can benefit educational institutions, students, instructors, and researchers in various ways. These stakeholder benefits include targeted course offerings, curriculum development, student learning outcomes and behavior, personalized learning, improved instructor performance, post-educational employment opportunities, and improved research in the field of education.

2.Identifying target courses**:** An initial benefit that evolves from using big data analysis in education is the ability of educational institutions to identify targeted courses that more closely align with student needs and preferences for their program of study. By examining trends in student enrollment and interests in various disciplines, institutions can focus educational and teaching resources in programs that maximize student enrollment in the most needed areas of study. Schools can better predict graduate numbers for long-term planning of enrollment (Althubaiti & Alkhazim, 2014).

3.Curriculum improvement: Using big data allows instructors to make changes and adjustments to improve curriculum development in the educational system, such as in the use of curricular mapping of data (Armayor & Leonard, 2010). Through the analysis of big data, educators can determine weaknesses in student learning and comprehension to determine whether or not

improvements to the curriculum may prove necessary. Instructors can engage in educational strategic planning to ensure that the learning curriculum targets student needs to maximize learning potential.

a. Student learning outcome, behavior, and process: Another key benefit of big data and text mining focuses on the ability of schools and instructors to determine student learning outcomes in the educational process as well as determine how to improve student performance. Researchers noted that the use of educational data mining contributed to positive results in the learning process (AlShammari, Aldhafiri, & Al-Shammari, 2013). Analysis of the data can help educators understand the student learning experience through learner interactions with technology tools such as eLearning and mobile learning. Use of big data also reveals learning behavior, the impact on adaptive learning, and level of persistence (DiCerbo, 2014) in the learning process.

b. Personalized learning: Using learning analytics, the concept of personalized learning reveals student success. Dietz-Uhler and Hurn (2013) asserted that course designers do not account for students who do not begin specific coursework at the same learning stage and who do not proceed, learn, and master course competencies at the same pace. Learning analytics allows faculty to use data collected by the learning management system to observe the frequency of student login. Instructors can also see student interaction within the course, total engagement, pace, and grades. These components serve as predictors of students' potential success or failure. Learning analytics allows for real-time reception of the pertinent data, review as well as the incorporation of data, and real-time feedback for every student.

c. Post-educational employment: Using big data allows educational institutions to identify post education employment opportunities for graduates and help target education that more closely aligns with employment market needs. It can also predict graduate employment, unemployment, or undetermined situations about job opportunities (Jantawan & Tsai, 2013). Using big data can help stakeholders in the educational system better understand vocational prospects for students and better assess student learning programs for occupational compatibility. In a global learning environment, this type of information not only can facilitate better educational and post education vocational planning, but also may prove useful to organizations as they make hiring and budgeting decisions for college graduates in different disciplines.

Learning analytics help to improve e-Learning:

1. Helps to predict learners' performance
2. Provides learners with a personalized e-Learning experience
3. Increased learners' retention rates
4. Helps to improve future e-Learning courses
5. Boost in cost efficiency (Pappas, 2014).

Learning analytics in many respects, have the ability to change the world of e-Learning whether in educational institutions or in corporate training. With the data collected through analytics, instructional designers and e-Learning professionals can offer learners the one key thing that all e-Learning courses and training modules strive to offer (Pappas, 2014).

Framework for Learning Analytics

What is analytics all about?

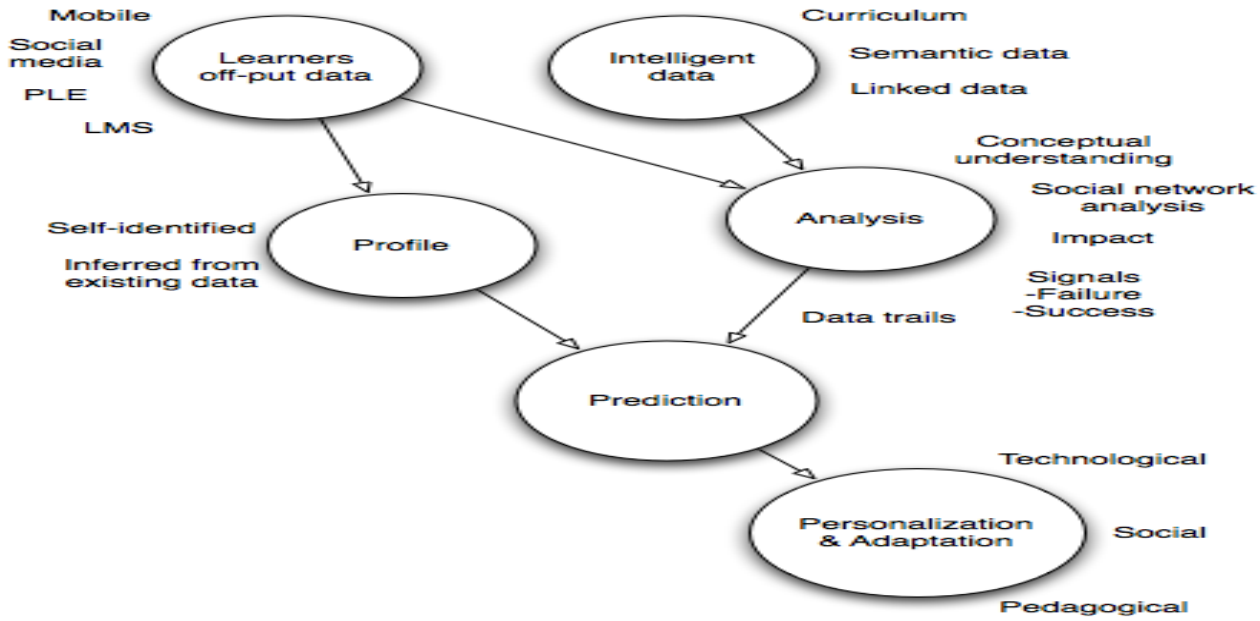


Fig 1.1

Source: Long and Siemen (2013)

Educational data mining is concentrated primarily on the complex problems of removing merit from learning-related big data. Learning analytics is anxious with increasing aspects of learning, while academic analytics concentrated further on utilizing data for marketing and administrative

purposes (Long & Siemens, 2013). The collection, analysis and reporting of big data on students to predict students' retention, understand learning behaviors, and improve learning through conditioning than individualized assessment and assistance is introduced to as learning analytics (Siemens, 2013). The use of learning analytics for predictive reasons is extended to expand to university and system wide projects (Heath and Leinonen, 2016). Nevertheless, at the present-day the application of big data to learning analytics for the motives of learning pedagogy is less common (Dede, Ho, & Mitros, 2016), usually demanding small-scale projects with an emphasis on apprehending learning and teaching ways (Siemens, Dawson & Lynch., 2013). The uneven focus on forecast over learning focus the breach between the use of big data and learning analytics for prediction and its usage to intensify instruction (Dede et al., 2016). As argued by Dede et al. (2016), the basis for learning analytics should be the effect on student learning, with research needed into how teachers and students could use learning analytic tools to improve learning. In order to evolve instrument to ease student learning, an essential first step is to understand students' approach towards and concern about learning analytics.

According to Andrew, Barbara and Marie (2018), framework within learning analytics include:

1. Descriptive Analytics: it takes the student's past and aims to analyze the student data to find patterns in the student's learning progress. Descriptive analytics describe what has happened and the way things are, allowing the researcher to make strategic decision on the best teaching styles for each student. This can be done using a Learning Management System that a teacher can build the tool.
2. Predictive Analytics: It offers insight into future trends in students' understanding of the material. Predictive analytics uses the student's past data and current data to determine what is likely to happen next. This can identify students who may soon be low performing or low engaging. This can allow the teacher help at- risk students get back on track.
3. Prescriptive Analytics: This not only provides teachers with data that can be used to make actionable decisions, but it provides alternative suggestions to make teaching more effective. Based on the student data collected, the analytics tool generates suggestions on different educational resources and tools to utilize in order to make greater impact on students.

Teachers can use standardized data to assess instructional decision making and can also use different form of instruction for different students (Dunn, Ariola, Lo, & Garrison, 2013).

The Open learning initiative for example, depicted multiple uses of micro learning data from online systems. The open learning initiative developed learning systems for colleges courses such as Statistics, Biology and Physics. Open learning initiative researchers explained how the data gathered automatically as students' interactions with their learning software could be useful not only for delivery measures of students' performance but also for informing improvements to the learning software, providing feedback to instructors teaching a class using a software, and exploring basic questions about how people learn (Andrew, Barbara & Maria, 2018).

Levels of Learning Analytics

Since learning analytics covers a wide range of analytics, Simon and Timothy (2018) discussed the three levels of Macro, Meso and Micro of learning analytics as follows:

1. **Macro-Level:** This enables analytics within the cross-institutional level, and can become more increasingly real-time and involves more fine data from the Meso and Micro levels. It is also important to note that at the macro level, learning analytics can be incorporated in non-educational sectors such as the government sectors. Macro-level analytics seek to enable cross institutional analytics, for instance, through maturity surveys of current institutional practice or improve state wide data access to standardized assessment data over students' lifetimes. Macro-analytics will become increasingly real-time, incorporating more data from the finer granularity Meso/Micro levels, and could conceivably benefit from benchmarking and data integration methodologies developed in non-educational sectors.

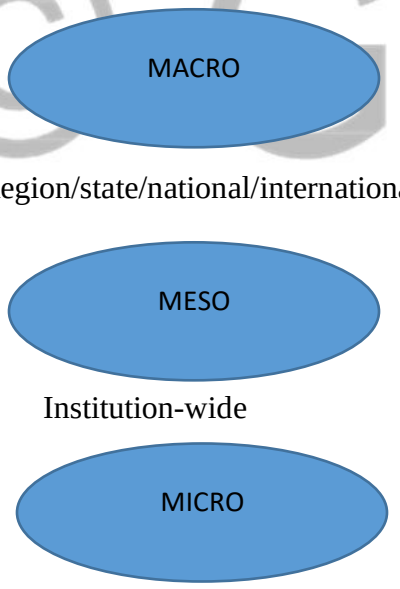
2. **Meso-Level:** This enables analytics at the institutional level, and at the Meso level, partners from the institution are involved like the faculty and the support staff. Simon and Timothy (2018) stated that the business intelligence imperative to optimize processes to build better Meso levels of analytics (ie. academic analytics). Meso-level analytics operate at institutional level. To the extent that educational institutions share common business processes to sectors already benefiting from business intelligence, they can be seen as a new business intelligence market sector, who can

usefully appropriate tools to integrate data silos in enterprise warehouse, optimize workflows, generate dashboards and unstructured data.

3. **Micro-Level**: Might be the most popular level in learning analytics. It operates at the interpretation and tracking of individual/learner data. At this level, student success is strongly related where data are collected, analyzed, and translated to improve learning and increase the success of students. Micro-level analytics support the tracking and interpretation of process-level data for individual learners. This data is for primary interest to learners themselves, and those responsible for their success.

According to Simon and Timothy (2018), the breadth and depth at the Macro and Meso levels add power to micro-analytics. Aggregation of millions of learners' interaction data creates a solid meso and macro levels. Therefore, effective learning analytics demands mutual enrichments between the three layers of analytics.

The three layers of Analytics



Source: Simon and Timothy (2018)

Conclusion

Learning analytics, the analysis and representation of data about learners in order to improve learning, is a new lens through which teachers can understand education. Learning analytics offers new routes for teachers to understand their students and hence, make effective use of their limited resources. Learning analytics helps to predict learner's performance, provide learners with personalized eLearning experience, increased learner's retention rates, helps to improve future eLearning courses and boost in cost efficiency.

Learning analytics helps provide educators with feedback on students learning activities and performance. Learning analytics tool led to the enhancement of data visualization, user interface and supported feedback types. Evaluation of the improved tools allow us to see how the improvements affected the user's perceived value of the tools.

Learning analytics in many respects, having ability to change the world of eLearning whether in educational institutions or in corporate training. Learning analytics are web-based measurements and reporting about student learning that is intended to help teachers improve the knowledge and skill acquisition of their students. This maximizes student learning potential while enhancing teaching and delivery methods. Though its application to education is relatively new, scientific disciplines have been using it for over forty years.

Suggestions

1. Educational institutions need to develop relevant curriculum. They would be required to invest in local research and develop locally relevant solution to various problems.
2. Investments in digital teaching and learning materials may need to be complemented by investment in training for teachers if such content is to be used successfully across an education system.

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