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The efficiency of big data predictive analytics using integrated LMS tracking technique for learners in e learning

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ABSTRACT

In higher education organization the predictive power of LMS data to report and track e learners needs more pedagogical interventions and time. Predictive Analysis of LMS tracking data provides a meaningful information for decision making. With the contribution of huge volumes of data referred as "BIG DATA" the pattern of e learners can be reported with much ease, and can be used for improving e learning courses and for the betterment of decision making analysis. Analysis of 'Big Data Learning' provide with information to improve in-class/traditional environment, eLearning and teaching experiences. A brief discussion of this paper deals with the various methods, tools and technology of predictive, integrated LMS tracking technique and big data analytics

I. INTRODUCTION

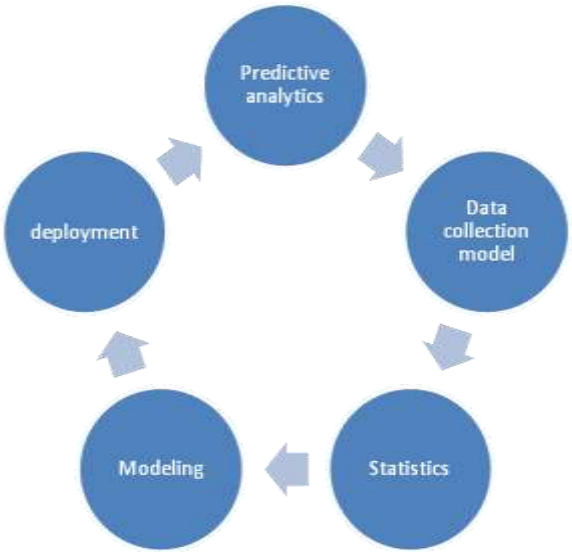
a. Tracking Techniques in eLearning

Certain important factors like content curation, multimedia integration, course layout are important, the main key aspects of an eLearning course development is tracking learners activity and monitoring the behaviour. With the help of data collection and analysis, eLearning professionals able to identify trends of the learners and ensure that their learners benefit the most out of the eLearning experience. Out of many tracking technique integrated LMS fits for a wide range of learners.

b. Predictive analytics for e learning

Predictive analytics has been for more than a decade and quality of data are the foundation of any predictive learning analytics. Predictive Analytics is a branch of analytics which is used to predict unknown future of events. Predictive analytics uses many techniques. Predictive analytics supports decision making.

With growing volumes of data and with faster, cheaper computers, easy to use software, predictive analytics is used more to predict the future for not only e commerce and business but they are used in e learning too. With predictive analytics it is much easier to predict the behavioral pattern of data. The process of predictive analytics process consist of



Fig(i) Data Science Tutorial[2]

Data Collection - Data is collected from multiple source of information[2]. After collection the data is inspected, cleaned , transformed and modeled to fit the required needs.

Statistics - The data are checked with statistical methods in order to validate assumptions.[2]

Modeling - It supports the ability to create automatic predict model to predict the future[2]

Deployment - It provides options to deploy results.

II.BIG DATA PREDICTIVE ANALYTICS IN ELEARNING

Big data predictive analytics – A blend

Big Data analytics forms the most important criteria for any decision making action. A huge investments are given for analytical tools[10]. From the requirement needed for development and the learning required which includes the topics to be covered, big data supports to know the information usage. The analytics and modern technology, various training can be improved and adapted for a better delivery in real-time information usage for learners.[10] Blending different approaches [10]in eLearning enabled by data gives a best results. A survey of eLearners was found "that over 80 percent of learners in the corporate division setting where face to face course was found to be very productive. In another 83 percent were given feedback by trainers who are there

physically present". Blending online training and classroom training found to deliver quality results[10]. Few of the blending approaches can be

i. Diverse devices training
ii. Personalized learning

Big data in eLearning has been created when the learners engage in various e learning activities which can either be through LMS or in campus e learning technologies. Predicting the course ,time and frequent topic search of students using LMS in Big Data Analytics also have an important stand in predictive analytics.

Method of collecting data based on course- Resource and results

From learners view collecting some forms of data[12] are is common factor. From post-eLearning course evaluations to the targeted audience reaction, content, learning environment, knowledge assessing that has gained and retained and the all way towards the behavioral changes that result from the eLearning. [1]forms the source of data collection methods.

There are different metric available which are descriptive and predictive metrics. From all eLearning course, evaluations from learners can be noticed that a constant interaction with co-learners results in a low score[12]. When using essential hypothesis an improvement and opportunity for learners to interact between each other for the entire course results in an overall satisfaction among elearners gets increased[12]. For more precise and for a clear improvements to learner interaction is based on the set of eLearning content, the post evaluations results in success. Based on the scores, the predictive analytics for better decision-making in eLearning course design can be achieved.

Methods of various tracking technique [5]for e learners

- Method of Integrated LMS
- Method based on Manually
- Click Method
- Custom / click stream Method
- Method based on Web Server

- **Method of Integrated LMS**

Platforms give you the ability to track learners activity in daily bases with respect to times completion and other important data. This methods mostly deals with cloud based technology[5].

- **Method based on Manually**

It is the basic tracking techniques in eLearning. It provides minimum data[5]. At the end of course completion, a certificate is issued. Later this certificate is issued to a facilitator. They keep track the learners who have

completed the eLearning course , evaluated and received the score[5]. The manual tracking method typically requires time, it is more budget-friendly since installing software is not required.

- **Click Method**

This tracking technique helps monitoring the visited e learning pages. This page gives the opportunity to get the deep insight of the methods in which the page is clicked based on the module received, the peak time visited, and the duration of the learner stayed on a specific[5]. The tracking technique deals only with the page views. The limitation of the tracking methods is that the completion duration cannot be specified.

- **Custom/clickstream Method**

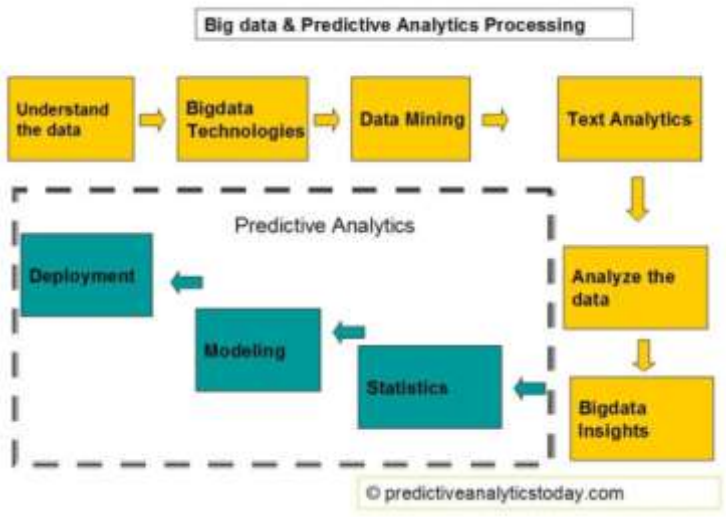
This methods is based on database and the other is clickstream methods. It is based on tracking technique to produce more specific data. The clickstream tracking technique involves web analytics tools[5]. It modifies using a particular code in order to produce a web log that with more in depth details about the learner more information.

- **Method based on Web Server**

The web server tracking technique, the instructor monitors the number of times the learners visits the eLearning course[5], the pages accessed and the duration spent in e learning course.

III. IMPACT OF BIG DATA PREDICTIVE ANALYTICS FOR E LEARNING THROUGH INTEGRATED LMS TRACKING TECHNIQUE

The learning analytics uses data sources from LMS which describes the user's online interaction and the result about the evaluation test. E-Learning analytics consist of the use of data science techniques over the data coming from Multiple sources



Fig[ii]: Data Science tutorial[2]

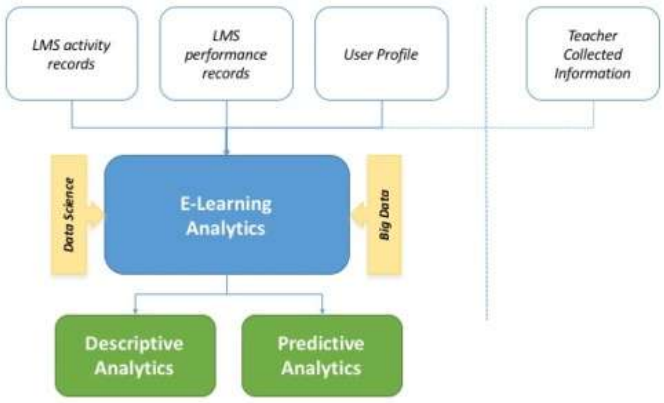
When using the effective eLearning tracking techniques the learners pages, course visited, pattern and behavior can be tracked. This offers the opportunity to personalize or customize the targeted eLearning experience. With the support of tracking methods the return on invested (ROI) for eLearning course.[5].Track learner patterns[8] helps to identify patterns that also enable to learn about the learning behavior of individual as well as the learning pattern.[8]. Tracking can be done from start to finish with respect to test and the time taken for completion in each module.

The two main types of analytics are categorizes as

i. Descriptive and
ii. Predictive

The *descriptive analytics* provides the in depth about the past and supports decision making with respect to the future e learning process[8]

While the *predictive analytics* supports the on going process and the impact it creates on the process action. It allows the e professional to take a proactive action as and when required.

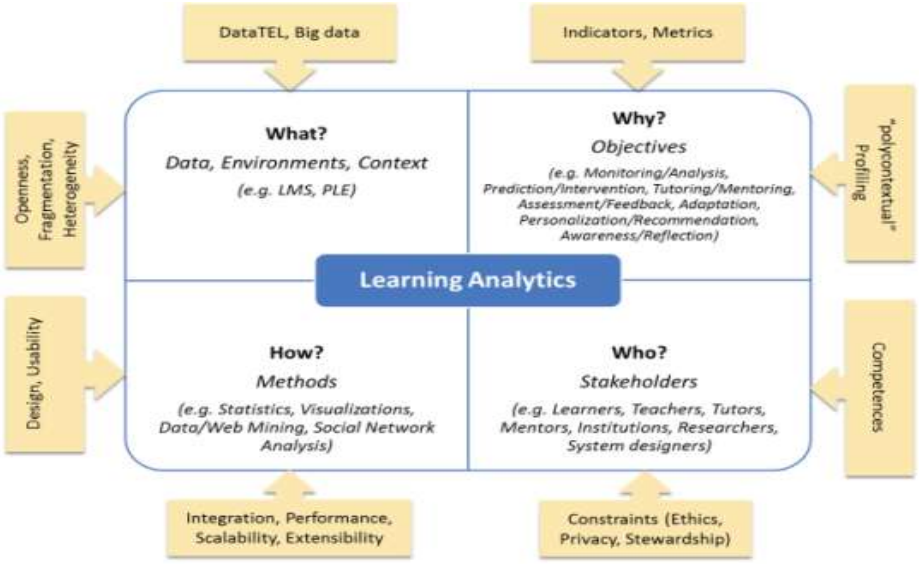


Fig(iii) image, IADLearning[7]

LMS platform supports tracking ability of e learners. The aspect of LMS is to generate reports in various formats like the PDF format or CVS format. LMS platforms helps in data transfer with respect to learning and reporting activity. The reports thus generated contains information of the progress along with respect to number of repetitions of a particular page that has been visited during learning course. The most important factor of LMS [7]

- ***Assessment*** – With respect to assessments tracking, the elearners receive a maximum score on either a quiz or an exam at the end of each eLearning course/ module. Finally a certificate or an indication denoting the access completion is generated.[7]
- ***Content completion*** - With content completion the elearner view the entire pages of the eLearning course and finally complete all the necessary tasks in order to receive a certificate.[7]

When there are huge volumes of data which has to be analyze is referred as "big", In such cases the traditional data processing [10]and their applications cannot deal with the data in a speculated time the challenge of processing such in depth data requires Big Data computing techniques.



Fig(iv) image, IADLearning[7]

Through tracking technique the behaviour of learners are predicted[10] and the pattern is arrived to support in decision making. When the volumes of data is available to analyze it is considered as "big". These big data can be used for reasonable time. With the help of Big Data computing techniques data can be used to study in-depth about individual learning pattern for providing better solution.

'Big Data Learning' analysis helps individual data to draw larger conclusions about the over all change in design module. The e learning professional gain in- depth knowledge of modules where the majority of learners struggled, and modify the way to teach or deliver the content. Modularizing future helps e learning professionals to watch the test or quiz questions for more incorrect answers. The prediction[10] in education is mostly data-driven. The collected data from different sources are processed and analyzed. By using the most advanced data science techniques, and relevant analytics the results are obtained. With the help of these analytics the in-depth of learning process are performed which in turn meet the required educational actions. In order to understand data pattern both descriptive and predictive analytics[10] are essential. From the hypothetical scenario discussed putting together larger data sets which may be used can get very complex and unwieldy data set which is dealt with analytical talent and tools to support big data.

IV. STRENGTH AND WEAKNESS OF E LEARNING TRACKING TECHNIQUE USING LMS

Strength	Weakness
i. Supports interaction both online and offline	i. Uncertainty in terms of authenticity of content and control
ii. Facilitates Natural and Active Learning	ii. Performance Tracking and monitoring
iii. Easy Access to gain Knowledge	iii. Managing Social Networking Sites for tracking technique
iv. Supports Multiple Learning Styles and Generates Dynamic Learning Content	

V. CONCLUSION

Social media is subjected to continuous changes, predictive analytics inform all kinds of talent-related decisions. The tracking technique of elearners progress inside the classroom training setting and on the other hand, eLearning courses are mostly delivered on the Learning Management Systems (LMS), which allows tracking and monitoring of elearners progress, the usage, and other parameters automatically in an efficient manner. Big Data analytics becomes more complex in education and eLearning with tools being created to analyze information that are aggregated from learning management systems and learning technologies. With all the predictive analysis using integrated LMS the pattern and behavioural trend holds good in e learning tracking and support system.

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