Learning Analytics - Improving the Impact of organizational Training Process

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Abstract

With the business world heralding the Data Revolution, every organization, regardless of size, industry or maturity is evolving to collect data about every aspect of their business. However, successful organizations would be those who do not just collect the data but those who get the actionable insights from the collected data. The growing focus on value creation from the organizational data has impacted every function of business. The Data revolution is changing the landscape of organizational training process. In fact, this data revolution is an outcome of various aspects collaborating in present day's business environment: the increasing interest in utilizing learning as a device to absorb both internal and external spectators, the rising demand to power learning data to communicate business firms' decisions concerning human resource, the consideration to ensure that learning and development functions are so effective that they become a sustainable competitive advantage for the organizations. In this paper, the authors have endeavored in exploring the role of Learning Analytics (LA) in improving the impact of Training Process. This paper encompasses four sections which helped in portraying the ideas in a coherent fashion. Section one focused on introduction and objectives of the paper, Conceptual framework was emphasized in section two, how Learning Analytics impact the Training Processes was described in section three and the section four presented the discussions and conclusions.

Key words: Learning Analytics, LA in Learning and Development, Education Analytics

I. Introduction and objectives of the study

"What gets measured, gets managed" **- Peter Drucker**

With the introduction of several technological touch points in the contemporary learning environments, the leaners leave behind a digital footprint with plethora of information pertaining to their learning behavior and activities. Analysing this data would help both the learners and teachers in assessing the learning outcomes and planning appropriate interventions for meeting the learning objectives.

Learning Analytics is a fast-growing domain of Technology-Enhanced Learning research. While the existing scholarly literature related to Learning Analytics resonate several themes like Information Retrieval, Web Analytics, Educational Data Mining etc., this paper endeavors to explore the role of Learning Analytics in organizational training process.

It is not going to be adequate to communicate the top management that 70% of HR team attended interpersonal skills training program costed Rs. 75,000, 65% of the sales team attended negotiation skills training program costed Rs. 50,000. Practically speaking, the L&D heads are constantly being asked to report to the top management on the ROI for their training by answering questions such as:

How did the L&D programs help to reach the overall objectives?

What are the strategic business impacts of the L&D programs?

How will the L&D programs directly enhance team performance?

Can the L&D programs be repeated for the other teams as well?

Is the design and delivery of L&D programs effective?

To provide answers to these questions, L&D heads need to adapt and acclimatize learning analytics.

Objectives

The major objectives of thispaper are,

To study the role and impact of Learning Analytics on training process

To explore how Learning Analytics influences the Training Need Analysis

To learn the impact of Learning Analytics on Training Evaluation

Methodology

In this conceptual paper, different ideas on Learning Analytics were gathered and applied on training process to know the impact of LA on L&D. In this paper, secondary data were collected from published sources such as Journals, Newspapers and digital sources and used the information with appropriate acknowledgements. The authors have expressed their own ideas in this paper and provided discussion views. The authors have also used a few established cases and literature available on the theme of the paper.

Structure of the paper

This paper was broadly divided into four sections as mentioned below

Section-1: Introduction, Objectives and Methodology of the study

Section-2: Conceptual framework

Section-3: Impact of LA on training process

Section-4: Discussion and Conclusions.

II. Conceptual framework

According to UNESCO Institute for Information Technology in Education, Analytics is a term used in business and science to refer to computational support for capturing digital data to help inform decision-making. Learning Analytics appropriates this concept for education: what should a digital nervous system look like when the focus is on learning outcomes, and to extend the metaphor, what kind of 'brain' or collective intelligence is needed to interpret the signals and adapt the systems behaviour accordingly(Technologies in Higher Education : mapping the terrain, 2014).

The premise:Measurable Learning and Development

In an endeavor to assess the training activities of an organization, Learning and Development professionals generally examine data related to the number of training programs conducted, percentage of employees who have completed the training programs, the financial spending on training activities etc. However, to study the effectiveness of the training and development activities, it is pertinent to study how the training helped in achieving the business objectives, what are the longtime positive business impacts of the training, how will the training enhance the team performance etc. To facilitate such a study a deeper analytics of the training activities, the learners interactions, and their behaviors becomes important. While capturing such data in the conventional learning environment was challenging, with the advent of digital platforms, harvesting the required data for learning analytics has become a real possibility.

According to Society for Learning Analytics Research (SoLAR), *Learning Analytics is the measurement, collection, analysis and reporting of data about the learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs*(solaresearch.org, 2018).

Learning Analytics-Levels

The scales of analytics shall be broadly divided into three as portrayed below

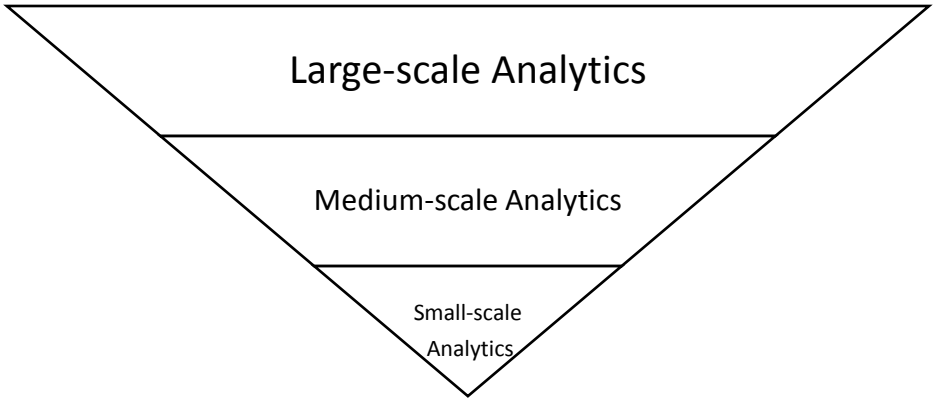

Figure 1- Scales of learning analytics

Large-scale Analytics

This level pertains to cross-institutional practices. This large-scale will become increasingly real-time incorporating more data from medium and small scale analytics.

Medium-scale Analytics

This operates at institutional level. To the extent that institutions share common business processes to sectors already benefiting from BI. This can usefully appropriate tools to integrate data silos, in enterprise warehouse, optimize workflows, generate dashboards, mine unstructured data, predict future market and so forth.

Small-scale Analytics

This helps in tracking and interpreting the process-level data for individual learners and groups. This data is primary interest to the learners and those responsible for their success. This data is correspondingly the most personal and can disclose physical activities such as geolocation, library loans, purchases and interpersonal data such as social networks. Researchers are adapting techniques from fields including serious gaming, automated marking, data mining, recommender systems, intelligent tutoring systems and social network analytics.

According to research report of Brandon Hall Group (Harris & Grebow, 2018), the learning analytics has grown from Learning Management System to Big Data Analytics. This research has revealed five identifiable stages as portrayed below in the learning analytics and organizations evolve through them over time

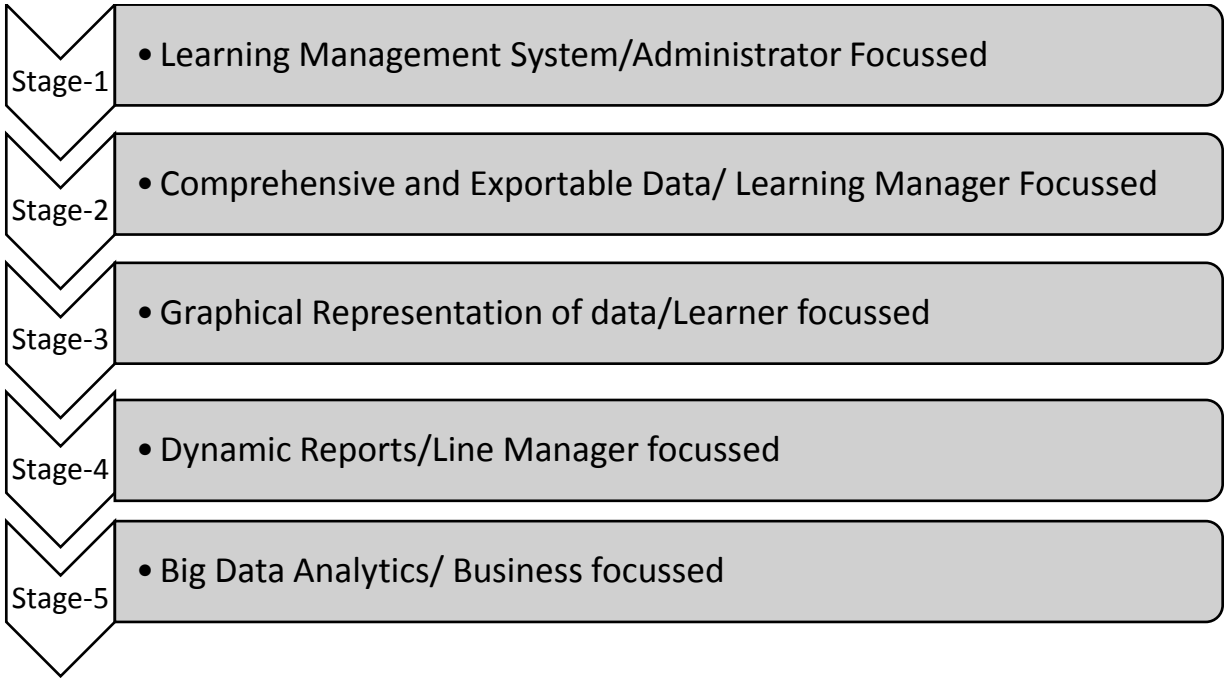

Figure 1- stages of learning analytics

Stage-1: Learning Management System: This was one of the early training management systems where training managers plays an important role in creating a flat file that captures the name of the trainees and course completion dates. As the organizations grow, the number of training programs have also increased. As a result, the flat files have become too larger ones. Reporting had also moved to the next level

Stage-2: Comprehensive and Exportable data: As the learning programs increased in numbers, learning managers realized that comprehensive data which are exportable in nature are required to meet the growing trend. The exportable data files which have replaced the flat files helped the learning managers to analyse the data and answer the queries.

Stage-3: Graphical Representation of data: This graphical representation of data stage is a learner focussed stage, as the analysis became more complex, interpreting the analysis needed to become easier. The result was the graphical representation of the data in dashboards and other dynamic interfaces.

Stage-4: Dynamic Reports: As line managers and top management started to use learning analytics to make routine decisions, they required to accelerate the analysis and reporting provided by the Learning Management System (LMS). The result is more dynamic reports and ad-hoc reporting tools that can update, analyse, and report information whenever needed.

Stage-5: Big Data Analytics: Big data is a collection of data sets so large and complex that it is challenging to process or analyse using traditional database management tools. Learning has become a critical business measure that often can show how "flexible" an organization is by looking at the overall level of skills and qualifications. This "big picture" requires the input of big data that is much more informative than the previous levels of analytics.

How learning analytics work ?

Organisational learning activites have undergone a huge change in the recent times. Information and Communication Technologies comprising of digital multimedia content and digital communication and collaboration technologies have proved to be very effective in learning activities. One of the remarkable developments in this domain is considered to be Learning Management Systems (LMS) and hence it is going mainstream in both face–to-face and electronic learning paradigms. Further, the importance of multi-disciplinary qualifications / skills and consequently the appetite for continuing education is giving the necessary space for germination and growth of online education. With digital technologies being deployed in

the learning processes, humongous amount of digital data is both consumed and generated by the leaners. This data which is in the form of digital learning content, access and activity logs, when harvested and harnessed can provide finer details about the leaners activities and behaviors.

As per several reports, many organizations globally have jumped into the LA bandwagon. However, as BA is evolving as a research area and a managerial practice, a single approach to embark on LA has remained a distant possibility. Different organizations have implemented and used LA in different ways factoring their readiness to adapt analytics and organizational objectives. While some have implemented new Information Systems exclusively for LA, others have integrated LA capabilities in their existing Enterprise Information Systems. Further, in most deployments, it has been found that LA is an extension of Web Analytics and Social Network Analysis.

Some examples of learning analytics software tools include (Learning_analytics, 2018):

BEESTAR INSIGHT: a real-time system that automatically collects student engagement and attendance, and provides analytics tools and dashboards for students, teachers and management.

LOCO-Analyst: a context-aware learning tool for analytics of learning processes taking place in a web-based learning environment.

SAM: a Student Activity Monitor intended for personal learning environments.

SNAPP: a learning analytics tool that visualizes the network of interactions resulting from discussion forum posts and replies.

SolutionpathStREAM: A leading UK based real-time system that leverage predictive models to determine all facets of student engagement using structured and unstructured sources for all institutional roles.

Student Success System: a predictive learning analytics tool that predicts student performance and plots learners into risk quadrants based upon engagement and performance predictions, and provides indicators to develop understanding as to why a learner is not on track through visualizations such as the network of interactions resulting from social engagement (e.g. discussion posts and replies), performance on assessments, engagement with content, and other indicators.

LA in MOODLE

Moodle is a popular Learning Platform or course management system (CMS) - a free Open Source software package designed to help educators create effective online courses based on sound pedagogical principles (moodle.org, 2018).

In an endeavor, to provide the required data for LA, Moodle automatically captures data pertaining to all aspects of learning activities. Moodle employs a number of plugins in addition to the built-in features to facilitate Learning Analytics. The list of plugins used in Moodle for LA is furnished below:

Logs
Activity
Activity completion
Live logs
(Quiz) Statistics
(Course) Participation
Survey
Course overview
Course completion status
Progress Bar
Events list
Activity results block
Configurable Reports
(Gradebook) Overview
Ad-hoc database queries
Engagement Analytics
Course Dedication
Graph Stats
GISMO, a graphical interactive student monitoring

As depicted in the figures 3,4 & 5 the Moodle plugins related to LA facilitate the learning facilitators to study the usage pattern of the learning materials, analysis of the learning activities and insights pertaining to the leaners engagement.

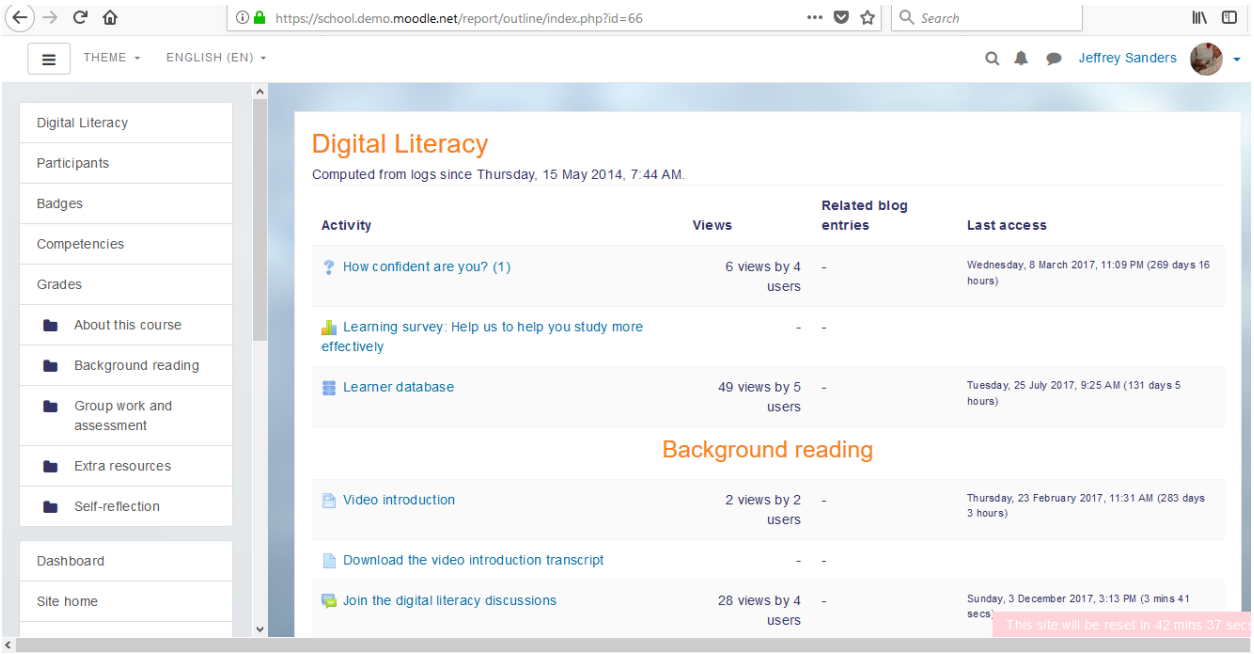

Figure 3- Activity report in Moodle

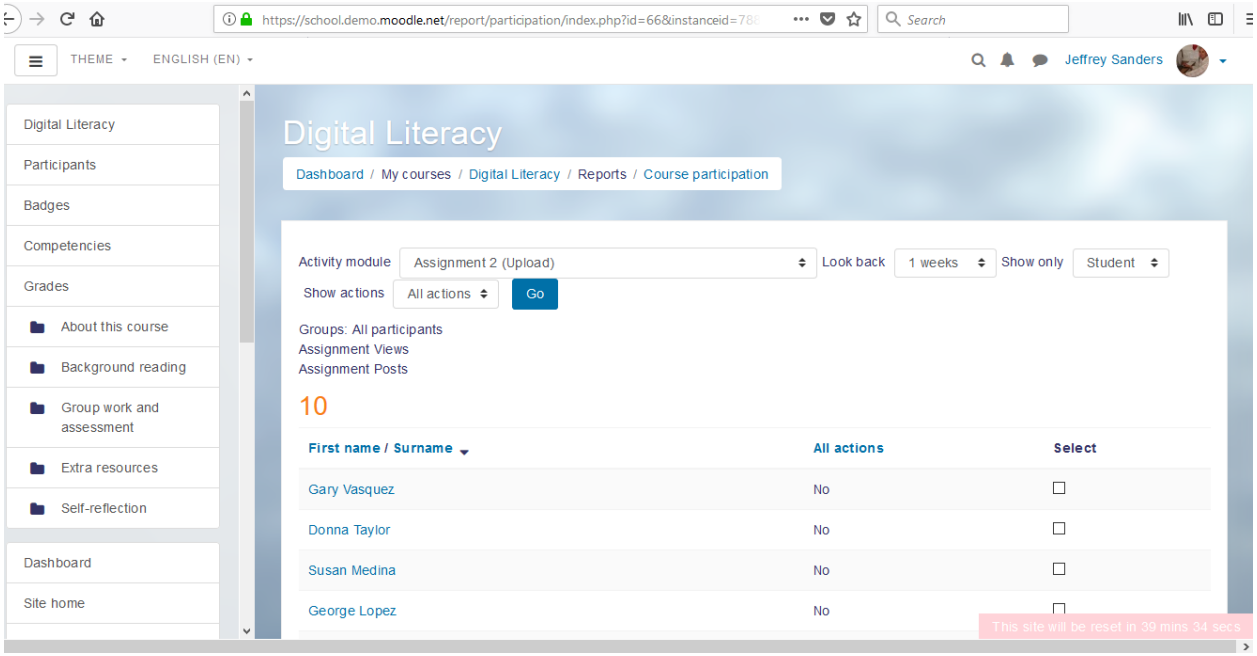

Figure 4- Moodle insights pertaining to Course Participation

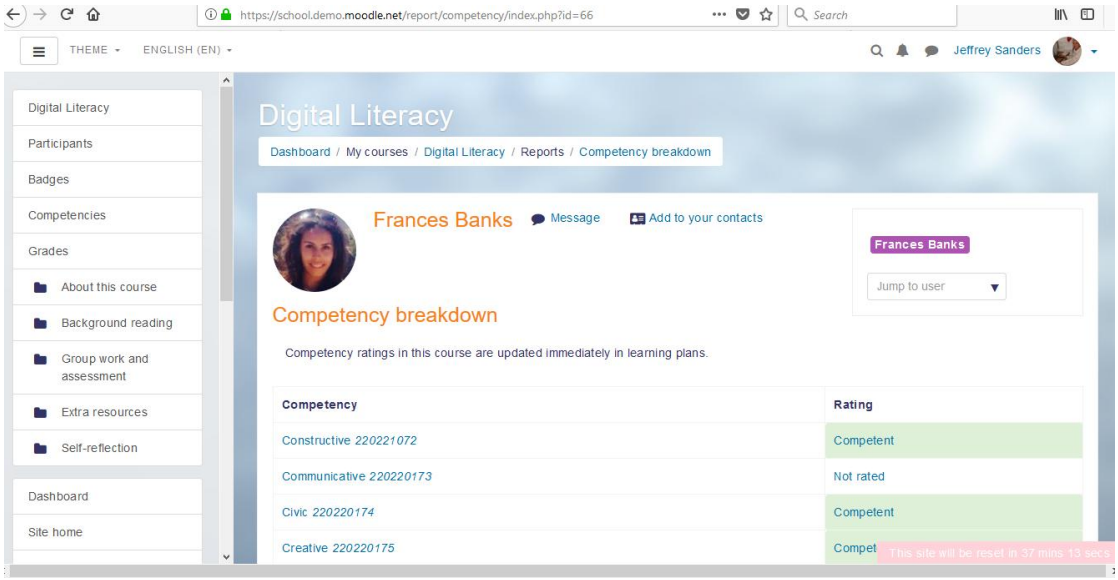

Figure 5- competency breakdown report in Moodle

III. Impact of LA on L&D process

Overview of Learning and Development

Why do companies continue to invest in training, even in the most difficult economic times?Companies invest more in training during difficult economic times produceimproved financial results, higher net sales, gross profits per employee, stock growth and ratio of market to book value.

Training system and process

When the top management devotes considerable time in setting up Learning and Development system and process, the following spin-off were realized

Provides knowledge and skills

Allows them to meet current job requirements

Prepares them to meet the inevitable changes

However, training is only an opportunity for learning

Learning is based on many factors such as

Design and implementation

Motivation and learning style

Learning climate

ADDIE Model of Training Process

One of the popular models in Learning and Development is ADDIE model i.e Analysis, Design, Development, Implementation and Evaluation. After each phase of this model, the impact of Learning Analytics was explored and analyzed.

The ADDIE Model of instruction systems design (ISD) was first developed for the U.S. Army during the 1970s by Florida State University's Center for Educational Technology. ADDIE is an acronym for the five-phase courseware development program of analysis, design, development, implementation and evaluation. ADDIE was later adapted for use by all branches of the U.S. Armed Forces. It has become a widely used and frequently modified best practice within the private sector. It is often employed for compliance training and other learning events that are not time sensitive (trainingindustry.com, 2018).

Analysis Phase

In this primary phase of Learning and Development, Actual Organizational Performance (AOP) was compared with Expected Organizational Performance (EOP). If AOP is less than EOP, then the training managers need to plan for Training Need Analysis (TNA)

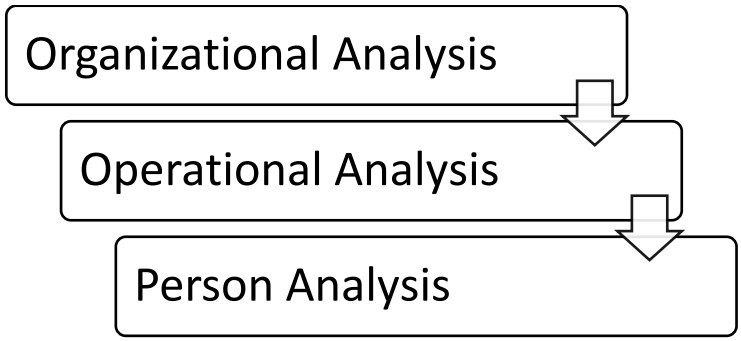

Figure 6- Levels of TNA

Organizational analysis is the examination of organization'sStrategy, Goal, Objectives, Systems andPractices to determine how they affect employee performance.

Operational Analysis is the examination of specific job to determine the requirements in terms of the tasks required to be carried out, KSAs required to get the job done and it is equivalent to Job Analysis/Task Analysis

Persona Analysis is the examination of employees in the jobs to determine if they have the required KSAs

Proactive TNA: performance problems in the future

Reactive TNA: focuses on current performance problems

Role of LA: The consolidated TNA data over a period of time becomes the big data for training managers through the Learning Management System (LMS). The big data shall be used to arrive at logical conclusions on training need analysis. As this state in the training process requires a lot of forecasting techniques to be used, learning analytics will complement to make this stage effective.

Design Phase

Once the Training Needs were identified, subsequently, training team must create training objectives, determine how the organizational constraints are addressed by the training, identify the factors needed in the training program, facilitate learning and transfer back the knowledge

Development phase

In this most crucial phase, training managers need to formulate an instructional strategy (order, timing and combination of methods), facilitate for implementation of training program and decide on content, materials, equipment, media and manuals. After this phase, the planned training program will be implemented.

Implementation phase

In this phase, all the previous phases come together and dry run or pilot training will be useful to test if the designed training program is effective

Evaluation phase

L&D managers evaluate the process and outcome of the training programs conducted for their employees. Krikpatric model of evaluation was one of the popular models in evaluation.

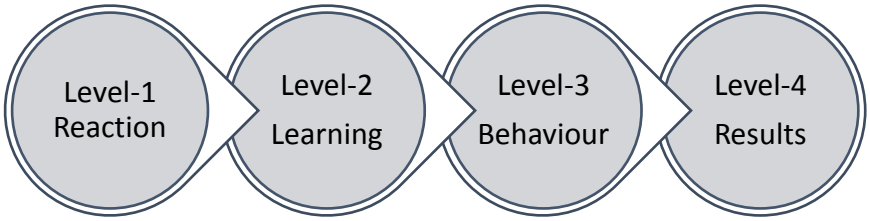

Figure 7- Krikpatric model of evaluation

Level-1 Reaction- measure the participants' initial reaction to gain an understanding of the training program and valuable insights into material quality, educator and more.

Level-2 Learning- measure how much information was effectively absorbed during the training and map it to the program or individual learning objectives

Level-3 Behaviour- measure how much your training has influenced the behaviour of the participants and evaluate how they apply this information on the job

Level-4 Results- measure and analyse the impact your training has had at the business level and be sure to tie it to the individual or program.

Role of LA: The customized questionnaires may be used to capture the opinions of trainees whether they could transfer the knowledge and skills gained through the training program on the actual field of working. Based on the module and number of days of the training program conducted, the questionnaire shall be customized. The data captured can be processed and analysed for the future use as well. Consequently, the data accumulated over a period of time comes handy for the future use. This will further assist in making the required changes in the module, content, trainer efficiency, time etc.

IV: Discussions and Conclusion

Based on the content used in the training program, pedagogical methods used and learners and learning perspectives, four Es of measurable learning have been portrayed below.

Four Es of Measurable Learning

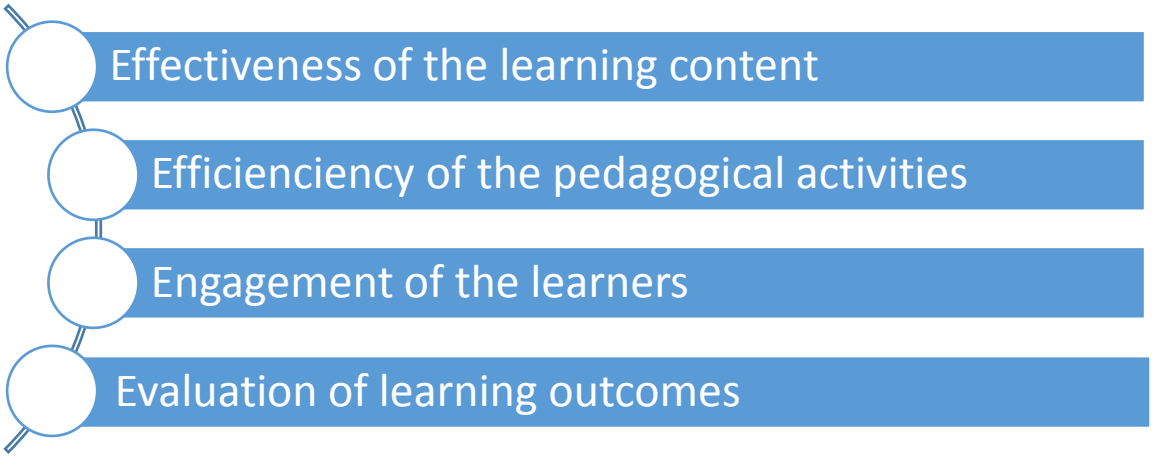

Figure 8- Four Es of Measurable Learning

LA Deliverables

Type of Analytics	Goal	Analytical method/technique employed
Descriptive Analytics	To assess the activities and performance of the learners.	Reports, Dashboards, Visualization.
Diagnostic Analytics	To look at "what", "when", "why" and "how" the learners used the learning content and participated in the learning activities.	Classification and Clustering. Social Network Analysis. Text mining – Categorization, Topic Modeling etc.
Predictive Analytics	To study the learning outcomes and its alignment with the learning objectives.	Regression, Machine Learning
Prescriptive Analytics	To identify the support / interventions that are needed to make the learning process successful.	Recommender System

Conclusion

Learning and Development managers are expected to report on the effectiveness of the training programs conducted for their employees. Nevertheless, communicating simple numbers about the training was not sufficient for the top management, whereas, measuring and communicating the Return on Investment (ROI) for the learning and development program was expected largely. Learning Analytics or Education Analytics with appropriate package shall provide the metrics that facilitates the L&D managers to study if the learning and development initiatives have met the intended organizational L&D objectives.

References

(2018, Feb 8). Retrieved from solaresearch.org.

(2018, 01 27). Retrieved from moodle.org: https://moodle.org

(2018, 2 27). Retrieved from trainingindustry.com: https://trainingindustry.com/wiki/addie-model-cpdc/

Harris, S., & Grebow, D. (2018, 2 27). Retrieved from trainingmag.com/: https://trainingmag.com/content/growth-learning-analytics

Learning_analytics. (2018, 2 10). Retrieved from wikipedia.org: https://en.wikipedia.org/wiki/Learning_analytics

(2014). Technologies in Higher Education : mapping the terrain. UNESCO Insitute for Information Technology in Education.