Revealing Big Data Emerging Technology as Enabler of LMS Technologies Transferability

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Abstract We are living in the information age where almost every aspect of our life, directly or indirectly, relies on information and communication technology (ICT). The uses of ICT through big data has increased which therefore ended to be everything can directly go through online and people are now able to upload, retrieve, store their information and collect information to big data. Through big data learning management system (LMS), student managed and stored their intangible assets such as knowledge and information, documents, report, and administration purpose. LMS is basically application software that is capable and designed to provide electronic learning, and has been acknowledged to yield an integrated platform providing content, the delivery as well as management of learning, while supplying accessibility to a wide range of users that include students, content creators, lecturers as well as administrators. Universities aim to successfully implement a LMS in order to ease the learning process. This successful implementation lead to Universities make Business Process Re-engineering for their learning activity. Throughout the years, successful implementations of LMS have proven to be a very beneficial tool, providing ease and convenience. LMS is used not only in academic institutions such as schools and universities, but is also popularly used in a number of private corporations to provide online learning, training and is also capable of automating the process of record-keeping as well as employee registration. The objectives of this study are to reveal big data as enabler

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of LMS as Business Process Re-engineering bring users specifically, various benefits of its multi-function ability.

Keywords Learning management system · Business core re-design · E-learning · Business Process Re-engineering · Big Data · Information security

1 Introduction

Learning management system (LMS) is popularly known in the communities of higher educational institutions as an online portal or platform that connects both lecturers and students together. It provides a local avenue where classroom materials or activities that are required to be shared, to be done easily and conveniently. Through big data technology it also represents a portal that allows both lecturers and students to interact outside of the classrooms without physically being in front of each other, making it possible for both parties to have online discussions that would otherwise be too time consuming if these discussions were instead conducted inside the classroom.

Today's era of big data observes a rapid increase in availability, ease in access as well as connectivity reach particularly in terms of internet access, especially in most urban locations, which is also where most universities are situated in. The internet can be defined as a vast computer network that links smaller computer networks all throughout the globe, scoping commercial, educational, governmental, as well as other networks, which all make use of the same set of communicative protocols.

This widespread ease of access in connecting to the internet has helped university students to increase their level of independency in their education, as lecturers normally hand out lecture notes, as well as any further information deemed necessary, to be left for the students to discover and digest information on their own. However, the university level of learning is still a two-way process, a culture where lecturers share their knowledge, and in return, students voice out their opinions and thoughts in discussions. Thus, it is important for university students to constantly broaden their scope of knowledge by frequently searching for information. Learning management systems represents the tool to ease this whole process.

The world has developed in various different ways and the most frightening development is in terms of technology which still continue to grow even until today. As the world become more modernized, the use of high technology in many ways is increasing every year which it give convenient to the society. For the past few years, institutions have begun using different methods of education to improve efficiency and distribution of learning methods such as the usage of technology to improvise the conventional teaching methods, in this case, the LMS or in general, E-learning. In organized enterprises, they concerned must working together, give encouragement to each other, support and feedback expected that the use of Internet in educational purposes will be increasing in the near future. Information and

Communication Technology (ICT) in education will create new possibilities because of new technologies that can also create changes in attitudes and leadership significantly. In order to make ICT functions smooth and efficiently, a team in charge of ICT will have to be able to cope and work together with new network of people. Nowadays, to make full usage of modern technology has become the problem to transform the organization faces by universities, government and industry [1, 2]. The program like LMS used by most of the companies and government agencies to manage information, staff development and internal communication. This means that distribution of information to staff members and internal communication is made easier and more efficient in government agencies and private sectors. In this modern era, the use of internet is obtainable and easy to get access [3]. This makes the use of LMS all the more important and should be featured in learning institutions and colleges because almost all nations have access to internet which is the main key in order to implement LMS.

LMS has evolved as the years went by since its first introduction. It has been undergoing a lot of changes and improvements in order to make the system to be more efficient and more user friendly which will also be talked about in the latter part of the report. There has been a myriad of research being done regarding LMS or E-learning in general. The report will make use of those research to uncover the benefits, uses, its implementation in developed and developing countries and differences between them and also the different types of LMS that are being used in the past and today.

1.1 LMS Aspects

LMS has a wide and broad definitions, Eke [4] defined that it is a way of learning either via the internet or any other electronic devices. Moreover, the definition of E-learning is where it symbolizes all or part of the aspect of academicals way of learning that are based on the tools such as the electronic media and the other devices that are used as a term to improve the ways to access self-training, communication and collaboration which in the end ease the assumption that act as a new ways of understanding and developing learning [5]. Whereas, according to Garrison [6], he defined that E-learning is an electronically ways that can be divided into two; (1) Asynchronous and (2) Synchronous communication as a reason to represent and to assure the accuracy of the knowledge. Therefore, this had proved the similarity of the definitions for E-learning in which E-learning is a way of learning which basically needed any electronic media and Internet to access the learning system in order for some students or teachers to learn and teach. Hence, E-learning is more than only a technology as a means to access course material [7].

1.1.1 Synchronous and Asynchronous Communication

Synchronous and asynchronous are two wide categories of LMS. In order to understand what is the relationship between both of these with E-learning, the explanation of synchronous and asynchronous will be continued under this sub-topic. First of all, synchronous is where it uses a learning model that initiates a classroom course, lecture or meeting using Internet technologies in which all of the participants need to be available at the same time so that it can be a live interaction between the participants and the lecturer [4]. Eke also described that asynchronous learning as a web-based version of computer based-training (CBT) which is typically offered on a CD-ROM or across an organization's local area network in which the participants can easily assess the course everywhere and every time they are available.

1.1.2 Benefits and Potentials of E-learning to the Students

LMS could be accessible 24/7. Some students may not be able to attend classes which cause miss some of important lessons. They can also learn it in their own way because the way that the teachers teach them may affect the understanding of another student which finally led to confusion. Hence, if the students do not understand, they can review the lecture notes back during their personal study. When it comes to assignment submissions, students can submit their assignments any time within the duration time given, they do not have to wait for the next class to submit everything. It will also help the students who take part time studies as they can study while working. Furthermore, E-learning can also help the students have more time to do their study and by E-learning, it can help the students to gain more knowledge from other sources.

2 Literature Review

The Learning Management System can be defined as a software that provide benefits or advantages to users to make work more efficient. LMS maintains all records, covering educational training courses that are being issued throughout the internet. As the software is accessible via online, not only LMS is being used by large organizations throughout the world, but also higher learning institutions. Today, there is an increasing number of free educational courses being published out the internet for society and the world. This education and training is known as E-learning or E-training.

As stated by Tao et al. [8], this new learning environment, which is centered around electronic networks, has given learners across universities globally, the ability to receive support on an individualised level, while also being able to have learning schedules that they would find more suitable to them. This allows a high

degree of interaction and collaboration between instructors, or teachers, as well as students, as compared to the traditional environment for learning. This new way to learn is characterized through the utilisation of multimedia constructs, made the process of gaining knowledge more active, interesting, as well as enjoyable [9–11].

Martin and Madigan [12], said that almost all people around the world handles a computer everyday, every time and thus, interactions and learnings are, being highly recommended to the base of E-learning as well as E-training, which also basically helps promoting a green environment, especially with the reduced amount of paperwork and the usage of paper in general with the use of LMS.

In a study conducted by Falvo and Johnson in 2007, for the past years, LMS gained enough use and popularity such that other alternative means to deliver contents and information to the classroom, such as live satellite broadcasting or closed circuit television is rapidly diminishing in relevance. This correlates with the increasing span of the ease in which the internet can be accessed, as well as the increasing number of consumer-friendly computers that are being sold worldwide. The introduction of LMS, and this increase in access, inevitably led to the rapid increase in the number of students and teachers towards the online learning environment.

The growing trend of E-learning is widely spreading across its entire educational system ranging from both public and private educational institutions [13]. It was discovered that there were three main factors that encourage these academic institutions to get involved in the implementation or the development of learning management systems, namely the increasing number of academic students nationwide, the increasing need of life long educational learning, and the widespread need for students to be prepared with the adequate knowledge and skills that is required in order to succeed in the knowledge economy [14].

A significant number of learning management systems in Europe are either purchased from small commercial vendors, or are developed by the learning institutions themselves [15]. Although the implementation of these learning management systems vary from institution to institution, the usage of such a software has grown to become a standard at colleges and universities.

It was also found out that both distant and on-campus students found the collaborative tools found in learning management systems to be the most valued, especially when they have the need to share learning during group tasks [16]. However, different students may have different needs from coursework as well as experiences within the learning management system. It was found that on-campus residents value higher the interactive content that can be found within a learning management system. On the other hand, students who commute to campus value more being able interact and share experiences from peer to peer within the learning management system [17].

The implementation and the design of a learning management system also has to take international students or students who wish to learn another language with the use of the learning management system, into consideration. When offered these types of coursework and courses that involve language, it should be taken into consideration how well the learning management system is conventional to

communicative language learning theories. Therefore, placing emphasis on developing a learning management system to be able to cater well and facilitate the needs of all types of learners, teachers, or any users, is undoubtedly of great significance [18].

3 Managing Change

LMS, has brought about a huge impact not only to certain groups of people or society, but throughout the whole academic world. Even though learning management systems, in major ways, could bring positive impacts towards society, however, there are certain groups of people which face difficulties in the attempt to adapt to these technological changes, especially those who originate from a less tech-savvy country. Most large organisations and as well as the government proceed with the use of learning management system, in order to manage their extensive size of important documents, organization development and staff. Generally, the effect of this framework is mostly on the learning group population for example students in higher institutions, where students can be expected to be independent in their research and gaining of knowledge. Thus, through making learning materials available online, it would only improve learning results only for specific forms of collective assessment.

Also, with respect to the knowledge to be gained and digested, the level of clarity, the offer of explanations as well as the confidence rating of making interpretations, may not be as effective compared to the traditional way of learning in the classroom. It can be argued that the learning process would be much easier with full use of face to face encounters with teachers or lecturers, especially in cases where the core structure of certain courses requires constant, independently-driven motives to conduct online research. This can go both ways, as instructors or lecturers also might not know the extent of how well the learner has absorbed the information tasked to be researched upon.

Moreover, since e-learning as well as having to access learning management systems require computers as well as internet connections at their preferred places of study, it might be somewhat burdening because having these may prove to be beyond the financial capabilities of some learners. However, a solution to this might possibly be having to lend these learners the necessary equipment, but this would undoubtedly lead to costs incurred by the institution.

Furthermore, Al-Busaidi and Al-Shihi [19], stated that the available tools from learning management systems are highly dependent on their will, and dedication to their chosen courses. There are a number of obstacles that have been identified as they were encountered by practitioners of the learning management systems. Al-Senaidi et al. [20] has stated that the common justifications for a lack of skills in the usage of learning management systems is the insufficient amount of time spent in the training and support. This lack of assistance can cause a problem on how to

manage the usage of this level of technology that learning management systems are based on, especially since users may originate from a less tech-savvy country.

According to Brown and Johnson [21], LMS also has other attractive miscellaneous features that can provide instructors with assistance in creating records of students, duty rosters and others that aim to have a more organized class, creating an instant group conversation, not to mention that learning management systems can have the ability to provide forms of student assessments, such as a quiz, or a test, through these online platforms.

It is undeniable that by following Fig. 1, above by using E-learning, it is more easier and more accessible for students to retrieve educational informations for their learnings. Not only that, lecturers and students can communicate and discuss about relevant tasks and subjects more easily through email or simply by messengers through their phones. But in the traditional system, all information and notice given are more to a physical standard hand-operated way. All that are being taught or said by the lecturer are not being fully accounted by all the students, but at least not all. The effectiveness are being aid by the quickness and misdeed [22]. The effectiveness is referring to on how the system are managed in order to obtain and complete given objectives.

Another benefit that implementing a learning management system can provide is through the utilisation of online forums, which can be supported by the learning management system platform. It provides opportunities for improved relations between learners and instructors. Through having these online forum discussions, any unwanted barriers that have the potential to hinder a learner's participation, such as social anxiety for example, can be eliminated, as discussion is done online. It aims to promote an environment where students can interact with one another, exchanging as well as respecting their different point of views towards any relevant matters.
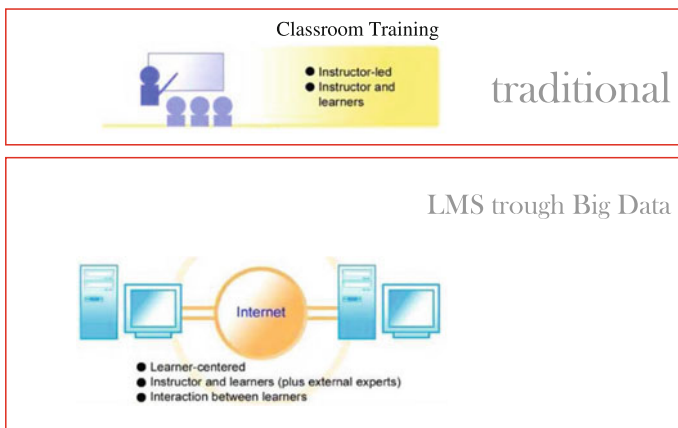

Fig. 1 LMS and traditional

On the perspective of the institution, fewer costs may also be incurred in such a way that less administration staff has to be employed, and therefore any costs associated with hiring more staff would be eliminated, such as office space, stationeries and wages. Also, with learning management systems, students better recognize the content associated with their chosen courses and therefore have the ability to know of any assignments due, or any content that needs to be reviewed by them prior to a given date. This allows self-pacing on behalf of students. Being able to study and complete assignments at their own pace and speed, no matter slow or fast, increases satisfaction and reduces stress [23]. On the other hand, certain notes given by the teachers might have limited information and could be difficult for some students to understand the content. In order to solve these problems, the students can just use YouTube website to watch and learn from a video education or use E-books to understand more on what they are learning. Search engines like Google also provide various websites that gives useful information and examples.

Furthermore, it makes students do their assignments easier because students do not have to continuously go to library every day to search for journals or books for their references to use in their assignment work. The student can just use Google books to find a variety of textbooks and use Google Scholar to find journals or any related reports from other researchers. This will be more convincing in term of time taken to do their research. All of the information will be available in a very short time in which we do not have to wait for few days. Other than that, new information is always being updated every single day in the internet. Therefore, the information needed would be up-to-date.

Less expensive and lighter to carry for the students, sometimes school textbooks are available on Google Book or E-book, students can just print out certain topics that are needed for study rather than buying the whole textbook at bookstores which it will cost more money. In terms of less weight to carry, usually students will carry along with them thick books or lots of files that contain notes to their lectures. Now, the students can just carry their devices such as laptop or smart phones for them to easily access to their notes for example, they can access the notes using Portable Document Format (PDF) files or even online textbooks such as E-books. E-learning can increase in students' participation during online discussions by which lecturers just need to open a group page for the students to discuss about certain topics that they did not understand during the lecture sessions. In this circumstance, this may increase the students confidence level as some of them might be to shy to voice out their opinion in class and sometimes the period of the lecture during the day is not enough for the students to discuss more and to give opinions at the same time. With E-learning, it can help the students to do their study alone without any disruption from others especially in the campus whereby there are lots of students at there that probably can cause a disruption for him/her to do their study. E-learning can also help the students to do work discussion easily through online with their small groups. It is also a convenience way for some students who have a part time job and are unavailable to do their assignments or study on time as they do not need to be rushing to do their work.

In terms of presenting their assignment, it leads to a better presentation as the students can show more visually to others so that it is easy to understand what they are presenting on that day. Before the existence of E-learning students usually will just talk or present their presentation using papers in which if they made a mistake they need to rewrite everything back and in the end lead to a waste of time for the students to rewrite back what they think is the best for the presentation. E-learning will also teach the student how to become a critical thinker, because they are so many information available on the internet from small information to big information that is usually hard to find but not all information from internet is true. This is when critical thinker takes action on applying whether the information that they gathered is useful enough to use or vice versa. This is because not all information that is gathered comes from a trusted source. It is important to check the author and the publisher before choosing the articles, journals or books.

3.1 The Benefits

Using E-learning can help the lecturers to check if the students commit plagiarism, whether the students are using reliable resources properly such as paraphrasing and in text citation. If the lecturers only required the students to submit their assignments in hard copy form, it would be difficult for the lecturers to check the numbers of plagiarism that are made by the current students. As for example Turnitin is an application that is used to check the plagiarism that the students might did. Also, in addition, E-learning can give an additional time for the lecturers to teach whereby in some universities the lecture session might be in a short time only in which the lecturer might face a difficulty to elaborate more on the topics that they were studying on that particular day.

Furthermore, E-learning can help both the lecturers and the students to be easily connected for them to ask questions and to discuss any topics that the students did not understand. The reason of this is because some students refused to voice out their opinions during the class session instead they prefer to email or chat with the lecturers personally after the lectures. In this way, it can help the teachers to easily recognised what are the students' problems so that the lecturers know what to do in the next lecture session.

Nevertheless, E-learning can also help both of the lecturers to save cost as some of the lecturers are usually use more than one textbook to prepare for class, some textbooks cost a lot of money and with the existence of E-learning, lecturers can just view the textbook for free on E-books which is if applicable. Printing and photocopying the notes for the students might lead to a high cost to the lecturers. Therefore, in order to save cost, the teachers can easily email the notes to the students and ask them to print it for themselves if they wanted to.

It is convenience for the lecturers as they do not have to worry about the class capacity for the students or if the teachers have urgent cases or meeting during the lesson hours. In terms of convenience for large number of student, Quizzes can

easily be done with an online application whereby the students who came late can access to the quiz if they are not in class. Other than that, E-learning can help to reduce error make by human such as spelling and grammar error. Lecturers can substitute the way the class will be held into a video so that the students are well prepared on what will happen before the class session starts. This is an alternatives way to teach the students as some of them want to study visually about certain subject instead of just listening to what the lecturers are saying during the lesson hours. This will also help to increase the student concentration in class. With this substitution, it is a different ways of learning style that can cover what the lecturers are lacking out at because not all students have the same ways of learning styles as some of them prefer learning by visual, kinetic or aural and a lot more. E-learning can lead to the lecturers to give a consistent message to the students that he/she is teaching. This is because if the lecturers tend to have more than one class with other students, the would be a higher chance where the lecturers would have missed out some points that he/she told the other students on the class. With the uses of E-learning, all of the students will get the same information without anything that will be missed out in the future lecture.

3.1.1 Benefit of E-learning to Environmental

With the advance usage of E-learning this could help the environment to be green and the carbon footprint can be reduced as for examples E-learning can reduce the consuming of papers as the students and even the worker need to use a lot of paper to print for their notes or paper work. If we consume many papers, this means that more trees will be cut down for the process of producing more papers in the future for the uses of other people.

3.1.2 Benefit of E-learning to Business

E-learning can benefit the business also as it will help the business to save their cost to train a new staff and the travel cost that are needed to train some employees. To easily recruit the new comers, the company can just give a video or a web address that the workers can access for their training session. If the companies keep on transferring some of the employees to go training, there could be some possibilities that the cost can be high and lead to the companies to face a huge number of losses [24].

4 Big Data Emerging Technology

Data is numeric figures for a particular of statistics or facts. Nowadays, there is huge amount of data being generated by smart phone, social media and so on. Big Data is where the number of users keeps on increasing that forms a data. Big data is a

collection of data from traditional and digital sources hence, it is too large and complex to manage it using current computing technologies [25–27]. There is no doubt that there are several difficulties when it comes to managing and analysing data. This is because the complexity of big data which require extra tools and big data analysis. Big Data involved unstructured and structured data. Unstructured data can be refer as an information that is not organized and easily interpreted such as documents, pictures, videos [28]. Social media posts are also part of unstructured data such as Twitter tweets, Facebook and more. In the other hand, structured data is more into many different data formats, types and it is stored in traditional relational database videos [28]. Traditional relational database is collection set of organized data stored in by showing the relation between the information. Furthermore, structured data is the data that can be obtained from human interaction between machines, for example, using web application.

According to Gartner (as cited in [29]), Big Data is often interpreted in many different ways therefore it can be describe using 3V's; volume, velocity and variety. SAS (System Automation Software) the software company introduced another two characteristics: complexity and variability (sas.com, 2013, as cited in [29]). Big data is such a big thing that volume, velocity, variety, complexity and variability of data is too massive to handle with. Therefore, it requires another tools so that big data specialists able to analyze the data to provide us insight of the Big Data.

In 2016, it is estimated that big data will drive $232 billion in spending according to Gartner (IT researcher). The scales of data, which often describe as big data volume, are created from various ranges of sources such as unstructured and structured data. For example, text messages, pictures, videos, TV, machine-to-data and more [29]. Velocity is the speed of streaming data. Data needs to be gathered from various sources therefore it needs to be processed and analysed. Sometimes, velocity is more important than volume because important information needs to be interpreted from what big data has provided. So that interested parties such as companies and health care will be able to make decision and act quickly without wasting time. Variety is information that comes in various types of formats for example unstructured data like Facebook contents, email and structured data such as cash transaction. Variability is about data flows that it can be greatly inconsistent which related with social media trends, daily, seasonal and other reasons. The disparity of data flow is depends with certain developmental indicators [29]. Big Data methods usually assume that interrelation can be considered practical indications of relations among the variables [30]. Therefore, any items or events that showing an abnormal behavior for example, unusually high rate flow of data of some categories may be linked with some kind of problem. Lastly, data complexity should not be confused with data variety. Data variety is more into different type of data formats such as videos, photos, whereas data complexity is about different type of data sources such as social media, blogs and so on. Therefore, these data need to find their connection, corresponding, organizing and transforming between other data sources across the systems. For example, by organizing and finding connection between the data from diverse data sources such as governments, corporations and so on helps to discover the issues.

In order for us to fully utilize big data, there are two types of big data technology that is operational and analytical systems [31]. Operational systems provide inter-active workloads and offer operational capabilities in actual time where data is primarily put in and kept whereas analytical systems analyse most of the data for complex analysis on past data. These two technologies are often bringing into action by combine these two together to enhance the quality of the data.

Operational big data, NoSQL big data systems for example document databases have evolved to address a broad set of applications and are optimized for more specific applications such as graph database [31]. It is also to use effectively the new cloud computing architectures so that it can be run efficiently and inexpensively. Therefore, this makes operational big data easier to manage, faster to apply and cheaper. On the other hand, analytical big data which known as Map Reduce systems are used to address the limitations of traditional databases system such as their lack of ability to measure the resources beyond single server. With increasing volume of data, these analytical workloads provide valuable information for busi-ness. Hence, although operational and analytical big data system slightly different but both does provide precious information if it is use for good cause.

4.1 The Benefits

Big Data is important for businesses, education, health care, banking, government and manufacturing uses. Big Data is use to gather data, storage and retrieval of data in order to assist our findings. Therefore, it helps us to collect and analyse the data to get the right information in order to distinguish and solve the issues. It is also helps to make fair decision and act wisely without taking any longer time.

From businesses perspectives, big data helps to targeting and gain more understanding about their products, customers, competitors and so on. When the big data is efficiently and effectively analysed and processed, hence it can lead to lower costs, increase sales, improvement in customer services and products. For example, retailers would be able to know who their customers are and why they choose their product. By using social media for example, Instagram, Facebook and E-commerce sites such as eBay, help sellers to understand who did not buy their products and the reasons behind it. Furthermore, customers now can give their reviews about a certain products through online which mean companies can use that information to improve their product weaknesses. Netflix is one of the examples of using big data to become one of the successful innovative companies. Netflix have attracted millions of users with its original high-quality programming that it knows will be fond of by large audiences, [32].

In the case of farming activities and agriculture, big data can be used to improve agricultural productivity. Studies shows that farm operations become ineffective which can reduce farmer's productivity by up 40% because of late planting or weeding, the lack of proper land and harvesting techniques. Therefore, to efficiently use big data, data can be collected to observe and analyses by the providers of

prescriptive-planting technology about soil conditions, seeding rates, crop yields and other variables from farmers' tractors and drones is combined with detailed records on weather patterns and crop performance. Next, the data is deciphered by algorithms and human experts, changed the data into useful information to advice farmers, and sent directly to their machines. This is to command the machines to set optimum amount of pesticides, herbicides, fertilizer, and other applications. Furthermore, a corn and soybean farmer in Iowa used a $30,000 drone to study how the yield in his 900-acrefarm that is affected by changes in terrain and other factors. This explained that farmers who have implemented big data technology which is known as data-driven prescriptive planting, based on analysis of nutrients in soil and other factors, it have reported a remarkable increase in productivity. In addition, this shows that even small modification in planting depth or the distance between rows of crops can lead to a significant increase agricultural productivity.

4.2 Privacy

Big Data collects patterns or behaviour of human or natural environment. It collects different types of data that includes health records. This can be beneficial for a private or public hospital or clinic to predict future health problems and to find ways to prevent future diseases, which benefits the public. However, this can make it as the disadvantage because it will expose the health problem that a patient faces which considered as personal information. Some people would prefer not to expose their health problems because they are fear of being judge by other people. This may lead to a serious problem as there would be a chance for the victims to instance attempting suicide.

Furthermore, big data can create inconveniences for the customer. For example, when buying vehicle insurance, the company need Social Security number where they can use this to get their customers' profile or other information such as their e-mail address. Once they know the contact details, the company will start spamming their customers' e-mail by offering and promoting the company's products. These can make the customers to feel dissatisfied which finally result to a huge lost in customer relationship, if the customers find it inconvenience. Fortunately, this can also be an advantage because some of the customers may find it useful because they will be aware about the company's products which cause improvement in customer relationship. Moreover, some people may be wary of what information has been collected. For instance, two big companies of social networking that use big data are Google and Facebook [33]. The users of Google and Facebook do not know on what information has been collected. This may create the feeling of fear from the users as the information can be used for identity theft. In addition, big data also collects most information of their customer's transactions that are made online. So, the customers' information such as their transactions and their behaviour of browsing on the company's websites can be seen from the big data technologies. Not only big data exist in online websites or large online companies, but it also used

in mobile phones. This means that people will know the wealth status of a person by knowing what brand of mobile phones they use. Since mobile phones are wireless and easy to bring anywhere they go, big data also collects the location of people via the mobile phones. Practically, big data in this case are not secure.

4.3 Data Size

Most big data contains lack of structured data, contain variety of information, information that last for a short period which makes it difficult to organised and search [34]. Storing and using data could also be a problem for some companies. Using the data is hard because they need to learn several techniques including learning a machine, processing language, predicting the future, learning on mapping the neural networks and social networks [35]. Once the company received the data, they have to sort it out to make it organized. This is because the data is stored in multiple locations and it is organized in many different ways [36]. This means that the employees of an organization have to relocate, organized and merge the data. Therefore, the management of an organization have to train the employees on how to sort out the data. This may takes time and needs to invest on training their employees.

4.4 Shifting Paradigm

Some companies might upgrade to big data as part of their decision making and may no longer using the traditional ways to make decision such as making decision in democratic style. Upgrading new equipment or tools in an organization give some negative impacts on the employees. This is because some of the employees may not be interested to learn and reluctant to change their culture of making decisions, even though the upgrades give more convenience to them. This may lead to a reduction on motivation level, productivity and an increase in numbers of labour turnover. As big data technologies are difficult and take time to learn, this may make them difficult to accept the change on the organization. It is the work of the chief executive officer (CEO) or other managers to convince their subordinates to learn about big data technologies.

4.5 Security

In terms of security, big data may not be secure. This is because some people misuse the information by doing criminal activities such as identity theft. In

addition, curiosity also leads to criminal activities where people accessing the data unauthorized [37, 38]. This may cause to a leakage of confidential information especially in the government sector that uses big data technologies. Big Data also can be use by the police to track down criminal activities such as drug distribution, fraud and bribes. However, the police can exploit this information by receiving bribes from the criminals to let them not facing the punishments that they deserve [38]. They receive bribes, by looking at the data of the pattern of the criminal to make sure it is secure to receive it.

4.6 Solutions of the Issues of Big Data

Transparency from the company is required in using customer's information. For example, the vehicle company that needs Social Security number. They can clarify to the customer why they need the Social Security number because this contains personal information. If the company need to contact the customers to notify about their products, they have to ask permission from the customer itself. In addition, the company also has to provide a freedom for their customers to stop receiving any information about their products anytime and anywhere they want. This is to avoid lost in customer relationship and also to make customers secure.

4.7 Convincing

These apply to the change in management from the traditional ways of making decision to using big data. The most important ways is to convince the employees who do not accept the change in management or culture. One of the ways to convince them is by explaining verbally and practically on the difference of outcome between the new technology used and the traditional ways. This can be done by the CEO or other employees such as manager to convince other employees or subordinates who are unwilling to accept the change of the culture. Moreover, the organization can discuss about the change of the management with their subordinates. This is to prevent from getting a high labour turnover, which could lead to the organization to be in a risk.

4.8 Understanding the Security

As security is one of the disadvantages of big data, it can be secure by using several ways such as understanding the security of the information that they collect [39]. It is important for the management of an organization to be aware of the security of the information that they collect because this involves with their customers [40].

Even though the information can improve their products and services quality, but if they do not understand well on the security, they are putting the organization in danger because it may have a chance of being sued by the customers for exposing their personal information. Other than that, the organization can set verification to access the information such as asking for username and password. This is to prevent from unauthorised access to the information [41].

5   The Challenge: LMS Through Big Data

Big Data is a whole load of information that is gathered through online sites when connecting technology that acts as a medium, to internet. It is formed from a collection of small and many structured of different data and information world-wide. One of the information or data that is not doubted to be found in the big data is E-Learning sites that have been posted or uploaded online. Whereas LMS is a new development concept of pedagogy in this modern era, which may vanish the traditional way of learning and teaching; face-to-face interactions, papers, pens and pencils. But there will be different people experiencing different collection of materials [42]. Moreover, different LMS programmes offer different courses. Consequently, the big data is storing the uploaded materials that are used for E-Learning purposes. Fortunately, E-Learning requires users to have the skills when using this modern and highly advanced technology, because LMS needs the technology itself and good internet connection. A complete set of the skills, the technology and the connection will allow the user to go for LMS. LMS has its own sites on the internet for E-learners to refer to. This is called as a Web page or websites. This Web page has its specific web address. All postings and uploads that are made, whether they are formed in words or numerical format, that are keyed in through online will automatically be saved in the big data. This is why when a user is entering the specified of particular web address; the process to get to the information will take roughly less than a few seconds to show up on the user's screen computer. It is because the information is already being set up for the specific web address. This is how E-Learning and big data are related.

LMS may sometimes require people to sign in or login before they can use or access to the materials. The reason is for a safety rights of every users and to keep track on the user's activities that are being sorted according to their identification or username. The procedure requires a space for storing every user's information. This is when big data comes in handy. Every information or materials used online will automatically transfer to the big data. At the end of the learning programme, marks or grades and the results of assignment will be delivered in a simple form of LMS environment [43]. This marked up the relationship between big data and E-Learning. Another relationship between big data and E-Learning is that information or sources in the E-Learning system are stored in the big data as for the users' reference. Despite of the importance of internet connection in the system, it also needs an advanced technology and IT skills for the use of E-Learning. This

includes the web layouts and features that have already been formatted and displayed in the Hypertext Mark-up Language (HTML) page. Which will then is saved or stored in the big data once the page and the layouts are see by IT experts or companies. HTML uses tags or codes for the graphics, headings, list, or body text, which concluded that HTML are the three components of text, tags and references to files [44]. This shows how the data are coded and formatted accordingly or in sequence. In addition, the HTML tag is coded different documents in it. HTML tag will be referred to the specific website or web address that involves or contained in the big data.

Big Data represents the whole picture of many and variety of different contents and contexts of information and data of worldwide internet used. E-Learning sites will only be bits in the storage room. E-Learning has many functions; auto-correction, improvements, can gain and access wide knowledge and many few. Ideally, E-Learning will determine the impact and effects of students and the school systems. Furthermore, analysing through big data can strategically identify any problems or errors, which an immediate transformation can be made after the detection or trial and errors (Fig. 2). This advanced procedure can eventually be done and improved by opting for alternatives or using different method and system after discovering faults and mistakes. This is connected to the big data storage. Unfortunately, big data can also be challenging in retrieving, storing, processing the sorted data, causing from the continuously growing information for millions of bytes daily in the big data per seconds [45]. Errors may occur if data is corrupted and is inconvenient and no longer can be used.

Moreover, the purpose and the goal of LMS can give endless opportunities in the 21st century in referring to the big data technology and ideology [6]. As changes of learning are growing much faster now, there will be possibility for other new and innovative ideas to be taken into account. Hence, the involvement of big data gives
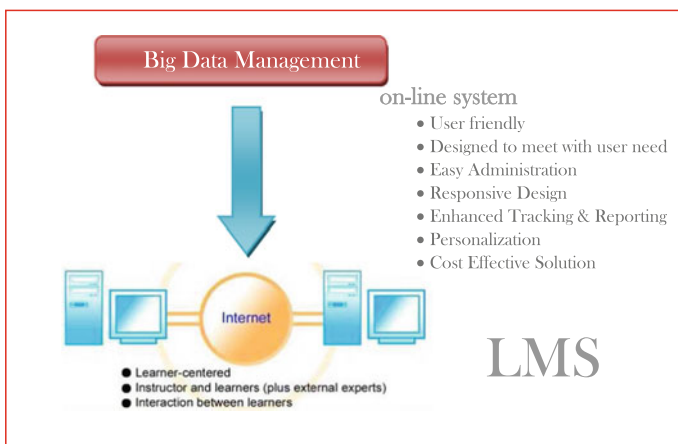

Fig. 2 LMS trough Big Data

people wide access to E-Learning Because it also diverse the idea of learning; distant learning or distant communication. It is arguable for the revolution of higher education [6]. Moreover, the duty of the big data not only just focus on the term education, it also covers other matters as well for example, health care and many other. E-technologies do not change the learning style, in fact they are actually removing constraints in terms of accessing, social behaviours and economy friendly [42]. This idea has the same meaning as to the idea of big data. Storage of information helps users to a wide access into relevant and reliable sources, to socialise by communicating through online. In addition, E-Learning is economy friendly, by means that users are now working in a paperless world [46]. Advanced technologies befriended humans and encouraging them to the most easy and available access of almost the cheapest education on the internet. Eventually, these good changes and transformations will prepare the world to be very IT oriented and minded. Technology varies rapidly from time to time; in terms of structure, multifunction, and other particular changes. It is very risky to stick or being loyal to one dusty and old-functioned technology. Therefore, education sectors should be responsible to keep on track on which technology is used by the corporate sector [47]. Other alternatives that can be taken into account, the authorities could keep pace on the newest and latest technology that is displayed and available, but should be cost lesser than the budget limit. Eventually this transformation will increase the capacity use for big data storage. As more and different new ways of how a technology can be capable of doing or has been differentiated the ability to function in advance. In addition, how the modern world is highly depends on technologies in many other activities; distant communication with other branches of a business, controlling traffic congestions for road safety, health pharmacy and many more. Lastly, big data encourages good decision making for the business to grow healthier in a market. In a way, that E-learners are learning through online, businesses can use both E-Learning and big data to introduce or promote and what are the benefits that can be retrieved in the area. Firstly, the use of E-Learning in the business is to contribute ideas and motivating people to invest in the business sector; uploading videos on how to succeed and participating in a business field. While, big data acts as storing the appropriate information for the use of the business and its people through internet and online [48].

6   Time Collision

Having all learners to be available at the same time in an online class might be impossible. This is because not everyone is available at the time slots that were given. As for examples, the in-service people (who are mostly having worked to do) may face difficulty to participate the online class during their working hour. This

was stated by Codreanu and Vasilescu [49], in which the learners or the participants have to be managed with the work, family or even vacation schedule changes that need to be made in order for them to be online at the same time as others for discussing questions and answers as many as possible in a live online dialogue.

6.1 Proper Training to Use E-learning

Both lecturers and the students need to be trained properly on how to use Information Technology (IT) in order for them to easily access using E-learning for the students to learn. Without a proper training, there could be a high complication on using E-learning in the future. Even if we asked the most experience lecturer to use E-learning in a sudden without a proper training, the lecturer can become frustrated to start something that is new for the lecturer [50]. Maddix also states that through a constant practice, E-learning requires having the right facilities, knowing the right procedures, and developing the exact abilities. Therefore, a right ways of continuous training may consume less time for both of them to succeed using the E-learning system.

6.2 Academic Fraud

Antoine [7] stressed out that a question would be appeared as to whether the student who is getting the credit is actually the person completing the assignment which this can also be known as an academic fraud. There is a possibility that the students who are applying for the courses are not the one who completed every assignments and quizzes that were given by the lecturer. Hence, if this happen, the student will take an opportunity to search for people who can do all of his/her work in order to be considering as a graduate student. In other words, traditional face-to face ways of learning is much more safety as the lecturers can easily recognised their students.

6.3 Technical Expertise

Eke [4] reported that a lacked of technical expertise would be the issues of using E-learning. Imagine that in a middle time of E-learning session and suddenly you face a technical problem, it would take a lot of time to fix the issue if there is a lack of expertise because there could be a chance that you are not the only person who faced the problems itself. It may take several days or even months if there are a limited number of expertise in the office.

6.4 Confusion of Lecturers and Learners

Another issue is that, the lecturers and the learners may face a confusing on using the E-learning [4]. If confusion and misunderstanding occurs between lecturers and the learners, there would be a chance that the learners might do a mistake on the format of assignment or reports, as there is limited communication between them. If the learners have done the wrong format, the chance for him/her to fail the course is very high.

6.5 Limited to Access to the Online Resources

In addition of this issue, not all libraries have a complete books or resources that are needed for the learners to do the research. Even if they try to do the research through online, some journals or the resources need to be paid first before accessing through them. As we know, some students may not be able to afford the amount that are needed to access the journals. Hence, according to Eke [4] ones again, that the uses of a huge amount of money to access the resources could be the lack of information gathered for researchers especially when involving the students. Therefore, this can be concluded that the learners may not be able to finish their research for the assignments.

6.6 Solutions of the Issues of E-learning

E-learning is not only helping the students to do their work but also lecturers or even the cooperation organisations. E-learning can have a lot of advantages and some disadvantages. The disadvantages can be overcome if they use E-learning correctly. E-learning users should consider what they want the sources for their work or assignments and not just copying everything from the internet or Google as some of the sources cannot be trusted. Before copying everything users need to filter which information they can use and whether the resources are trustable enough. Most importantly E-learning can reduce cost and this will be a huge advantage to everyone who use E-learning [51, 52].

7 Conclusion

LMS is quite related to big data, since it online are going to use data or information that stored in big data, such as videos that include the lectures and more education materials from big data to support the learning processes. All aspects or

perspectives of information have its own advantages which is same goes to the big data and LMS accordingly. The most significant outcome the implementation of LMS has level of convenience of contribution. In today's era of internet communication, where information can be disseminated in an instant over the internet, LMS prove to be an essential tool for university students and instructors alike. Not online can they keep in line with their assignments, the tools to complete their assignments, and various other assessments, university instructors also share the same level of ease, having an easier time in reaching out to their students whenever necessary outside of class hours. Although there are some difficulties to be faced in using a LMS, universities should provide the appropriate level of training and guidance for all users and then on, it would only be a matter of time where issues in access were only a memory, where the enhancement of their learning process remains to be the ultimate goal to be achieved.

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