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Application of Data Mining in Adult Education Students' Record Keeping: Implications for Higher Education Administrators

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Abstract

In recent time, a growing number of adult learners require the application of data mining for keeping their records. Ascertaining the progression of adult learners is also essential in nation building. Thus, the application of data mining is considered a top priority in a bid to track students' height of achievement. For scientific and technological development of this group of learners in higher education departments data mining is needed. Its application in keeping adult learners' record can also help to uncover hidden pattern of learning and achievement by using classification technique to breakdown students' record. This article explores the need for the use of data mining in record keeping of adult education students with implications for educational administrators.

Keywords: *Application, Adult Education, Data Mining, Students, Record Keeping*

1. Introduction

Education of adults is significant to scientific and technological development. The growth and economic development of any country lies on quality education. Recording is very essential in academic activities. Students' records enable higher education administrators to work on students' adjustment and progression by predetermining how and when students are supposed to be involved in learning. It is a track in which both low and higher achievers in education are better advised on further steps to be initiated. Hence, there is need for predetermining and grouping students appropriately in order to create enabling environment where students can be easily categorized based on capacity or other related factors. Since record keeping is an important issue in keeping educational light burning, data mining should be considered as a way to promote adult education students' record keeping.

2. Concept of Data Mining

The application of data mining in education is an emerging interdisciplinary research area known as educational data mining and is concerned with developing approaches for exploring the unique types of data that come from educational environments; its aim is to better recognize how students learn and identify the settings in which they learn to improve educational outcomes and to gain insights into and explain educational phenomena (Romero & Ventura, 2013). Data mining can help to ascertain students'

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weakness and strength to determine where intervention is needed. Data mining is a reliable technique to measure students' achievement; placement is another essential thing that data mining offers (Thilagaraj & Sengottaiyan, 2015). According to Olson and Delen (2008), data mining is an investigative way of processing raw information. According to Kavyashree and Durga (2016), patterns uncovered by data mining can be used for decision-making, in terms of determining academic strength and weakness of students, increase and decease in school population and academic striving. A number of authors identified the role of data mining in higher education such as a means of getting valid information particularly students' academic records (Hsia *et al.*, 2008); a technique for arriving at ways of harmonizing educational issues bothering on students' records (Berry and Linoff, 2004; Giudici, 2003).

Accordingly, Pujari (2001) saw data mining as non-trivial means of ascertaining originality, usefulness of data and its potentiality. Taniar and Rhaya (2002) noted that data mining is a skillful means by which relevant information is gotten from a database. Luan (2002) stated that data mining is means of ascertaining hidden character, ideas, pattern and personality in order to predict an individual's behaviour. Data mining helps to decrease the quantity of unprocessed information into a more useful information (Baritchi, 2004). Data mining can help educational managers to make favourable decision while dealing with a good number of students (Ramageri & Desai, 2013). According to Giudici (2003), data mining is defined as the process of selection, examination and shaping of numerous data to understand system and relations that were unknown at first instance with the target of getting sound and accurate outcomes for owners of the database. Ali (2013) noted that since the application of data mining is known to be successful in higher education setting, adult education students need it in making certain decision concerning their future career, understanding the educational trends, and increasing their level of intellectual understanding. Baker (2010) observed that data mining improve students' new thinking styles, knowledge capacity, mental upgrading and embracing scientific ways of learning.

Furthermore, data mining is used to discourage poor academic performance and poor attitude to learning (Kavyashree & Durga, 2016). The authors further noted that data mining deals with computational data to ascertain learning process of students; that data mining uses clustering, rule mining, web-based mining among others to discover hidden knowledge of students. According to Ali (2013), data mining does not only discover hidden knowledge or character but provide possible facilitating information to regarding such knowledge. This can be achieved with application of different algorithm of data mining on dataset. In view of this, there is need to create data mining awareness programme among educational managers, particularly, adult education administrators.

3. Recording Keeping in Adult Education in the Context of Data Mining

The issue of keeping of adult education students' record cannot be overemphasized. Record keeping is a major activity in adult education. Shamoo and Resnik (2000) stated that proper record keeping is a way forward to solving intellectual issues among students. Agarwal (2014) noted that data mining if well applied in students' recording keeping will help in discovery of previously unknown knowledge that will contribute meaningfully to educational decision-making. Data mining has immeasurable impact in education sector because every of its activities need to be kept well and appropriate for future academic purposes. Mohamad and Tasir (2013) saw data mining as an educational instrument with the mandate of exploring unique types of data to determine students' behaviour and learning environment. The authors further argued that data mining deals with extraction of knowledge to shape and build individuals life. Romero, Ventura and De Bra (2004) stated that extracted knowledge contributes in structuring effective teaching and learning.

The application of data mining can enable students to realize good opportunity and unknown behaviour pattern. Algarni (2016) noted that poor academic performance of adult students, spending more than required years of academic work and other educational shortcoming inform the need for educational data mining in order to trace causes and proffer solution to such academic concerns. Mostow and Beck (2006) noted that educational data mining is advantageous to building of students' records. The authors affirmed that the application of data mining makes learning and its processes clearer because data mining technique is used to interpret unprocessed students' information that could help resolve educational issues. Algarni (2016) suggested that the application of data mining of students' record may provide an avenue for validation and evaluation of effective teaching and learning procedure, students' perception, and challenges. Algarni further noted that the progress recorded in higher education due to data mining application demands its adoption at every level of education by educational administrators. Noting reasons why educators need to adopt data mining in record keeping practices, the author was also of the view that data mining is a powerful artificial intelligence tool used to predict educational success, gather reliable information and explore its relationship with learning outcomes.

Furthermore, the goal of data mining in educational sector include predicting students' future learning behaviour by creating student models that incorporate such detailed information as students' knowledge, motivation, metacognition, and attitudes; discovering or improving domain models that characterize the content to be learned and optimal instructional sequences; studying the effects of different kinds of pedagogical support that can be provided by learning software; and advancing scientific knowledge about learning and learners through building computational models that incorporate models of the student, the domain, and the software's pedagogy (Baker & Yacef, 2009; EdTech Editorial Team, 2013). In view of these, this paper is aimed at examining the place of data mining in students' record keeping.

4. Benefits of Applying Data Mining in Adult Education Students' Record Keeping

Adult education students are needed in all spheres of human endeavour, considering their knowledge, capacity and intellectual soundness in contributing significantly to scientific and technological development. Baradwaj and Saurabh (2011) developed a model for applying data mining procedures to predict students' performance in university education. Using decision tree method for prediction, it revealed that students especially fresh students needed special attention to decrease the rate of dropout. Regarding what students need for retention in order to reduce school dropout, the application of data mining can detect poor performance and other academic challenges of students on time. This marks an important role of data mining in recording keeping of students for better teaching and learning. In this regard, authors (*e.g.*, Baker, 2010; Baker & Yacef, 2009; Dwivedi & Singh, 2016; Kavyashree & LakshmiDurga; 2016) suggested the following as benefits for applying data mining in higher education setting:

- ✓ Modify students' attitudes towards learning.
- ✓ Improve cognitive, effective and psychomotor domains of learners
- ✓ Providing software packages for enhancing self-learning
- ✓ Enabling students to conduct quality research, among others.
- ✓ Predict and tackling students' learning hidden problem in order improve desirable learning.

Ali (2013) stated that application of data mining in students' record keeping will not only improve their skill of learning but assist in grouping of students, predicting academic achievement, rate of students' decline and teachers' performance and professional skill utilization. Castro, Vellido, Nebot and Mugica (2007) proposed that data mining deals

with assessment of students' learning abilities, assessing students' learning behaviour, evaluate online learning materials before and after use, thus, giving teachers an opportunity to gain feedback from their students. Fayyad, Piatetsky-Shapiro and Smyth (1996) attributed benefits of data mining to ability to track down educational hindrance and encourage teaching and learning between teachers and students. Algarni (2016) was of view that data mining has five approaches to students' record keeping. These are: predicting data mining approach, clustering data mining approach, relationship data mining approach, distillation of data for human judgment data mining approach and discovery with models data mining approach.

Furthermore, Chen *et al.*, (2005) pointed out the uniqueness of data mining is application of various techniques in predicting learning behaviour. Aksenova *et al.*, (2006) stressed that the interesting part of data mining is the ability to predict. Further, the authors were of opinion that predictive approach of data mining supersedes others approaches because if problem has not been identified, solution may not occur. This approach gives room for counsellors to recognize deviant behaviour in learning and achievement and device means to shape such behaviour. Pujari (2001) maintained that predictive data mining approach enable users to identify validity and originality of data and compare it potentially in order to gain comprehensive pattern of data. Luan (2002) was also of the view that application of data mining in record keeping will uncover hidden students' information in higher education institutions.

Adult education as an influencing approach to growth and development of human environment needs scientific technicality to checkmate her students' growth, change of learning behaviour, strength, and notify dropout rate, its causes and solution. Baritchi (2004) asserted that application of data mining in record keeping of students will reduce unnecessary information about their learning. Riyazuddin *et al.*, (2013) was of the view that application of data mining in keeping students' records will expose untested or unknown pattern of teaching and learning in order to ensure conducive learning environment for quality teaching and learning. Thus, data mining helps in discovery of important information about effective teaching and learning and unusual behaviour pattern in teaching and learning.

The target of teaching and learning is for quality educational achievement that can result to positive impacts in nation building. The application of data mining in keeping of students' record will restore hope for mankind. To Han *et al.*, (2011) application of data mining in students' record will assist educators in collection of raw information, processing raw information, interpretation of information for assisting students to develop new skills for self-reliance. Nagy *et al.*, (2013) noted that application of data mining in record keeping will help in selection of learning pattern, change of learning pattern, determining learning outcomes, and evaluation of teaching instruction. Berry and Linoff (2004) suggested that data mining can help to surmount challenges of teaching and learning, source rightful information, get to identify problem properly and solve problem of teaching and learning with appropriate information or techniques. Yin *et al.*, (2011) noted that application of data mining can avail educators an opportunity to understand the problem of teaching and leaching, collect relevant data to such effect, interpret and make necessary decision for better teaching and learning.

Therefore, the need to embrace innovative technology in education is seen as a welcome development since the mandate of education is to bring about a relative change in behaviour. With proper understanding of innovative technology in higher education setting such as data mining, its application can help to address the multifaceted educational problems that impede human development. To Giudici (2003) data mining offers strategic ideas, novel way of training and learning which may lead to attitude modification, especially among adult education learners. Thus, the turning point for adult education students could be the application of data mining in keeping to their day-to-day educational practices. It is obvious that many adult education students have not been

adequately trained to face the realities of the 21st century environment which is characterized by information-driven economy. A way of exposing adult learners to the demands of the 21st century could be by applying data mining in teaching and learning in higher education, especially in developing nations like Nigeria.

Also, educational data mining is building on and contributing to a wide variety of disciplines through analysis of data from various learning contexts, including learning management systems, interactive learning environments, intelligent tutoring systems, massive open online courses (MOOCs), educational games and simulations, and discussion forums and data-rich learning activities (Koedinger, D'Mello, McLaughlin, Pardos, & Rosé, 2015). Educational data mining considers a wide variety of types of data, including but not limited to raw log files, student-produced artifacts, discourse, multimodal streams such as eye-tracking and other sensor data. Educational Data Mining research communities aim to better support learners by developing data-driven understandings of the learning process in a wide variety of contexts and for diverse learners. Also academic discussions about data mining focus on topics such as deriving representations of domain knowledge from data, detecting and addressing students' affective and emotional states, informing data mining research with educational theory, contributing to theories of learning through data mining, data mining to understand how learners interact with emerging genres of pedagogical environments such as educational games, MOOCs, and exploratory learning environments, analyzing multimodal and sensor data, using data mining methods to provide support for teachers, parents and policy makers, bridging data mining and learning sciences, adapting state-of-the-art data mining approaches to the educational domain, building an understanding of social and collaborative learning processes through data mining, developing generic frameworks, techniques, research methods, and approaches for educational data mining, closing the loop between education data research and educational outcomes, automatically assessing student knowledge, and evaluating the efficacy of curriculum and interventions (Educational Data Mining, 2018).

Data mining in education has been used to predict student performance by means of classification and regression trees (Lin, 2012). This data mining models enabled researchers to predict what types of students would drop out from school, and then return to school later on (Lin, 2012). The data mining models were able to provide short-term precision for predicting which types of students would benefit from student retention programs (Lin, 2012). A data mining system was developed and used by researchers to assist an academic institution recognize and take action regarding students at-risk (Chacon, Spicer, & Valbuena, 2012). Educational Data Mining is often used in course management systems, such as Moodle, which contains usage data that includes different activities (Cheng, 2017). Some researchers have developed a simplified data mining toolkit that operates within the course management system and enable students and other instructors to get data mining information for their courses (Garca, Romero, Ventura & de Castro, 2011).). As an alternative to traditional static course patterns, data mining can be used to customize learning activities and adapt the pace for students to complete courses (Huebner, 2014; Wang & Liao, 2011). Educational Data Mining can create significant and optimal learning experiences for each student (Cheng, 2017).

Current studies on mobile learning environments suggest that data mining can be used to allow the provision of personalized contents to different mobile users, despite the disparities between mobile devices and conventional PCs (Cheng, 2017; Huebner, 2014). Educational Data Mining applications can enable non-technical users engage in data mining tools and activities making processing more accessible for all users (Huebner, 2014). There are some examples, including statistical and visualization tools, analyzing social networks and related influence on learning outcomes (Merceron & Yacef, 2010).

Data mining is a powerful tool for academic intervention. Through data mining, a university could, for example, predict with 85 percent accuracy which students will or

will not graduate. The university could use this information to concentrate academic assistance on those students most at risk. In order to understand how and why data mining works, it's important to understand a few fundamental concepts. First, data mining relies on four essential methods: Classification, categorization, estimation, and visualization. Classification identifies associations and clusters, and separates subjects under study. Categorization uses rule induction algorithms to handle categorical outcomes, such as "persist" or "dropout," and "transfer" or "stay." Estimation includes predictive functions or likelihood and deals with continuous outcome variables, such as GPA and salary level. Visualization uses interactive graphs to demonstrate mathematically induced rules and scores, and is far more sophisticated than pie or bar charts. Visualization is used primarily to depict three-dimensional geographic locations of mathematical coordinates. Higher education institutions can use classification, for example, for a comprehensive analysis of student characteristics, or use estimation to predict the likelihood of a variety of outcomes, such as transferability, persistence, retention, and course success (Luan, n.d).

Data mining can be used to highlight useful information and support decision making in educational institutions. In the educational environment, it can help educators and course administrators to analyze the students' course activities and usage information to get a general view of a student's learning. Statistics and visualization information are the two main techniques that have been most widely used for this task. Statistics is a mathematical science concerning the collection, analysis, interpretation or explanation, and presentation of data. It is relatively easy to get basic descriptive statistics from statistical software, such as SPSS. Statistical analysis of educational data (logs files/databases) can tell us things such as where students enter and exit, the most popular pages students browse, number of downloads of e-learning resources, number of different pages browsed and total time for browsing different pages. It also provides knowledge about usage summaries and reports on weekly and monthly user trends, amount of material students might go through and the order in which students study topics, patterns of studying activity, timing and sequencing of events, and the content analysis of students notes and summaries. Statistical analysis is also very useful to obtain reports assessing how many minutes student worked, number of problems here solved and his correct percentage along with our prediction about his score and performance level. Visualization uses graphic techniques to help people to understand and analyze data (Namratha & Sharma, 2016).

Data mining can be used for predicting students' performance, their knowledge, score, or marks. The value for such prediction can be numerical/continuous (regression task) or categorical/discrete (classification task). Regression analysis is used to discover the relation between a dependent variable and one or more independent variables. Classification is used to group individual items based upon quantitative characteristics inherent in the items or on training set of previously labelled items. Prediction of a student's performance is the most popular applications of data mining in education. Different techniques and models are applied like neural networks, Bayesian networks, rule based systems, regression, and correlation analysis to analyze educational data. This analysis helps us to predict student's performance *i.e.*, to predict about his success in a course and to predict about his final grade based on features extracted from logged data. Different types of rule-based systems have been applied to predict student's performance (mark prediction) in an e-learning environment (using fuzzy-association rules).Several regression techniques are used to predict student's marks like linear regression for predicting student's academic performance, stepwise linear regression for predicting time to be spent on a learning page, multiple linear regression for identifying variables that could predict success in colleges courses and for predicting exam results in distance education courses (Namratha & Sharma, 2016).

Data can be used for grouping students. Here, groups of students are created according to their customized features, personal characteristics, *etc*. These clusters/groups of

students can be used by the instructor/developer to build a personalized learning system which can promote effective group learning. The data mining techniques used in this task are classification and clustering. Different clustering algorithms that are used to group students are hierarchical agglomerative clustering, K-means and model-based clustering. A clustering algorithm is based on large generalized sequences which help to find groups of students with similar learning characteristics like hierarchical clustering algorithm which are used in intelligent e-learning systems to group students according to their individual learning style preferences (Namratha & Sharma, 2016).

Data mining can be used for enrollment management. This term is frequently used in higher education to describe well-planned strategies and tactics to shape the enrollment of an institution and meet established goals. Enrollment management is an organizational concept and a systematic set of activities designed to enable educational institutions to exert more influence over their student enrollments. Such practices often include marketing, admission policies, retention programs, and financial aid awarding. Strategies and tactics are informed by collection, analysis, and use of data to project successful outcomes. Activities that produce measurable improvements in yields are continued and/or expanded, while those activities that do not are discontinued or restructured. Competitive efforts to recruit students are a common emphasis of enrollment managers. The numbers of universities and colleges instituting offices of "enrollment management" have increased in recent years. These offices serve to provide direction and coordination of efforts of multiple offices such as admissions, financial aid, registration, and other student services. Often these offices are part of an enrollment management division. Some of the typical aims of enrollment management include improving yields at inquiry, application, and enrollment stages; increasing net revenue, usually by improving the proportion of entering students capable of paying most or all of unsubsidized tuition; increasing demographic diversity; improving retention rates; and increasing applicant pools (Namratha & Sharma, 2016).

5. Educational Implications

Data mining can help to improve quality assurance and e-supervision in educational institutions. Data mining can contribute a lot of improvements in every aspect of school system. It is transforming how education is being delivered. For this reason many educators are of the opinion that this type of technology will in future control the entire activities within the educational system. The school system in Nigeria is often influenced by constant electronic technological changes. The ability of the stakeholders and actors within the school system to adapt to these changes has attracted attention in the last decade. One of the various ways through which electronic technology is enhancing school system is e-supervision. The application of ICT in supervision is what is known as e-supervision. E-supervision is one of the means through which technology is enhancing the school system. There are several ways through which the school system could be supervised using traditional means; however, Information, communication and technology has introduced other forms of supervision. These new forms of supervisory methods are currently practiced informally by different supervisors. “Supervision is an intervention that is provided by a senior member of a profession to a junior member or members of that same profession. E-supervision, according to Carlin, Milam, Carlin and Owen (2012) refers to the use of videoconferencing technology to provide real-time supervision. Although the e-supervisor is physically housed in a location that is different than the supervisee, the videoconferencing technology allows the e-supervisor to observe a variety of professional activities. During these observations, the e-supervisor has the ability to see, hear, and evaluate the supervisees’ performance during the delivery of interventions, assessments, and other professional activities. Research has indicated that supervision within the school system is one of the major influences on the student

outcomes (Browne, 2001). Many times the supervisors are assumed to be knowledgeable in specific areas hence being used as reference points by the students, the government and the society at large. For this reason, the quality of school system is greatly attributed to supervisors' efforts to perform all activities that are offered in those specific areas which will affect the overall performance of the students. Quality assurance in education is the efficient management, monitoring, evaluation and reviews of the resource inputs and transformation process (teaching and learning) to produce quality outputs (students) that meet set standards and expectations of the society. It is the set of activities that an organization undertakes to ensure that a product or service will satisfy given requirements for quality.

As noted above, data mining can help to improve supervision in educational sector. There are many reasons why instruction or teaching and learning must be supervised. First, teaching is done with a uniform curriculum which defines the general standard in a given state. Instruction must be supervised to ensure that the curriculum implementers, (the teachers) conform to the approved standard which ultimately assures the quality of education in the area. Second, there is a big gap between the school training received by teachers in their various institutions and the actual teaching job in their places of deployment. This does not necessarily mean that such new teachers were not well trained or that they are not intelligent enough to do the job, but experience matters. So, such new teachers need to be mentored (clinical supervision) by more experienced actors in education such as older teachers, the principals, and other designated supervisors to enable them put in their best. This can promote quality assurance. Third, curriculum needs to be amended from time to time to meet the current societal needs. When there is an amendment in curriculum, it is through regular and well planned supervision that teachers' awareness shall be created. If there are no supervisors to draw the attention of teachers to new trends in the education industry, the quality of education must be in doubt. Fourth, so many teachers may ordinarily choose to be lazy or neglect their job if there is no supervision. So, for the quality of education to be assured, teachers and all educational administrators need to be checked from time to time so that non performing teachers would be made to perform while those who are doing well should be encouraged to do more. In the same vein, if there is no regular supervision, there is the tendency that funds meant for the implementation of educational programmes may be mismanaged by some careless and greedy administrators. However, fund mismanagement does not encourage quality assurance in education because such found should have been used for such educational projects like infrastructure, provision of instructional materials, students'/staff welfare services, among others. Quality assurance is meaningful when application of its strategy is not offered till the end of an educational programme. In this context, quality assurance mechanism involves quality planning, provision of required number of teachers, development of school curriculum, provision of teaching and learning facilities and assessment of teachers' professional performance to ensure quality education. In educational system, quality assurance refers to consistent provision and utilization of good and high standard resources so as to foster effective teaching and learning at every usage and in all aspects of educational system. Effective supervision of instruction and quality control mechanism enables secondary schools' principals to reinforce and enhance teaching practices to ensure teachers quality in their various schools in order to contribute to the improvement of the students' learning. Quality assurance is committed to critical examination of the worth of educational program/activities and the dissemination of the best practice in instructional delivery and management of education.

Effective supervision of instructions and quality control are the responsibilities of the principals for sustaining secondary school administration of secondary schools. If schools are to provide quality educational programs for all students, the principals must hold teachers accountable for providing appropriate and well planned programs. These

programs include a variety of teaching strategies designed for the enhancement of pupils' learning, evaluating of teachers, assessment of students' progress, instructional strategies, lesson planning, lesson preparation and presentation, monitoring of students' progress, conducting practice sessions, conducive teaching and learning environments; and supervision strategies among others. Supervision of instructions in secondary schools can enhance quality assurance for effective academic growth and schools' administrative structures. Quality and quantity of the work must be specified in clear terms to classroom teachers. New and inexperienced teachers need to be given necessary orientations about classroom activities (Onasanya, 2008). Supervision of instruction as quality assurance mechanism in secondary schools could facilitate the achievement of educational goals. It is however seems that there are factors that militate against successful supervision of instruction and quality assurance in Nigerian secondary schools. It seems that government, teachers, communities and the society, parents, guardians and the students contribute to the problems militating against effective supervision of instruction in Nigeria secondary schools. Supervision in secondary schools is carried out with a view of ensuring quality and effectiveness of teaching and learning activities (classroom instruction). For quality to be assured, there is the need for effective supervision of instruction geared towards achieving educational objectives. Supervision of instruction as quality assurance mechanism is a special practice that can easily help the secondary school educational system to achieve its goal if properly handled.

As can be seen, the place of data mining and other ICT tools in education cannot be overemphasized. Modern day teaching and learning are conducted and facilitated through the use of telephones, projector, computers and computer communication networks through the internet. The phenomenon has given birth to the contemporary e-commerce, e-government, e-machine, e-banking and e-education among others. The rapid growth in ICT has brought notable changes in the twenty first century as well as affected the demands of modern societies in enhancing quality teaching and learning out-come. ICT is becoming increasingly important in our day to day lives as well as in our education systems because every sector depends on it for quality assurance. Realizing the effect of ICT on the workplace and everyday life, educational institutions try to restructure their educational pedagogy in order to bridge the existing technological gap in school administration and management for effective communication In order to achieve these stated objectives to guarantee quality assurance in our secondary school system, our teachers need to be motivated. Motivation is the process of influencing or stimulating a person to take action that will accomplish desired goals. Teacher motivation is a way of empowering teachers in their occupation to put in more effort in their work. It further involves the perception, variables, methods, strategies and activities used by the management for the purpose of providing a climate that is conducive to the satisfaction of the various needs of the employees, so that they may become satisfied, dedicated and effective in performing their task. In education, teachers should be motivated in order to boost their productivity, effectiveness, efficiency and dedication in performing their task. This will enhance quality assurance, quality education and quality instructional delivery in the education system. It will also enhance the achievement of educational objectives. Thus motivation of teachers in the educational system is of crucial importance and significance to the quality of educational innovation and delivery outcome. Motivation which should include good working conditions, promotion, staff training and development, good salary and remuneration, participatory decision making, job security, recognition of performances and the teaching profession, financial rewards, scholarships, awards and provision of other facilities are strong tools for improving the status of teachers. Teachers' motivation has great significance or value in the Nigerian education system especially in guaranteeing and aiding quality assurance. When teachers are highly motivated and adequate attention given to them, it will help to elicit teachers' commitment and dedication to their job of teaching. This will certainly help to add value

and quality to the educational system by raising its standards to the expected level; thus ensuring quality teaching-learning outcomes and output. Teachers' motivation influences such other variable like quality output, quality performance, enhancing quality educational outcomes and instructional delivery. Again, teachers' job satisfaction and productivity are of great significance to guaranteeing quality assurance in the education system. When teachers influence the educational system positively, they intend to perform their task effectively and efficiently and all educational goals will be achieved with positive outcomes and the outputs from the school system will be competent-vibrant, educated personnel's that will contribute immensely towards societal development and nation building, as such quality assurance is guaranteed.

The teacher and the students are often at the centre of all discourse within the spectrum of quality assurance in education. Thus the teacher functions to build up, instruct, train and guide the young one for healthy growth and stable adult life. Often the teacher provides activities materials and guidance that facilitate learning. No teaching can therefore take place without the learners. The interactive process between the teachers and the students therefore form part of this study. They have much role to play in the crusade for quality assurance in education. Educators globally are aware of the need for effective teaching in order to improve the students learning achievement. The emerging empirical evidence shows that countries in the developed world are concerned with school effectiveness and teachers' effectiveness and accountability for student performance is mandatory. As such, the strategies employed by the teachers to improve students' learning are important and must meet set educational and teaching standard. Building teacher capacity imply investing in human capital to enable teachers teach effectively. Improving students' performance will enhance the acquisition of skills in cognitive, psychomotor and affective domains which are critical for intellectual and social development. Teacher professional development on data mining technology can help in building teacher capacity which enables teachers to acquire teaching skills and knowledge, share teaching experiences and collaborated with peers, gain access to career opportunities for professional development and enhances teachers teaching quality. Capacity building forums exposes teachers to variety of professional development opportunities that includes curriculum support and study groups and mentoring and induction programmes.

Educational institutions can benefit from data mining which utilizes a blend of a clear knowledge base, advanced analytical skills, and domain knowledge to uncover hidden trends and patterns. These trends and patterns form the basis of predictive models that enable analysts to produce new observations from existing data about students and teachers. Professional development in this area can bring in expertise from outside the school, enabling teachers to work collaboration with peers, get opportunities for mentoring and coaching on data mining, focusing on the classroom and teachers in the choice areas to develop and data mining activities to undertake. The outcome can enable teachers have comprehensive pedagogical and content knowledge of subject matter and the learning process that influences students' achievement. Teachers' content knowledge, pedagogical content knowledge, curricular knowledge and the knowledge of education ends and content provide distinct bodies of knowledge for teaching which every teacher must possess if effective teaching has to take place. Teachers who pursue professional development and learning help to improve students' learning. In-service training of teachers improves their capacity development which fosters sustainability. From these, we deduce that teaching skills, professional characteristics and classroom climate within the control of the teacher influences student progress. Teachers who attend seminars, workshops and conferences gain experiences that help in enhancing teaching skills and results in improvement of teaching approaches in the classroom.

One way to effectively address quality assurance challenges facing educational institutions is through the analysis and presentation of data, or data mining. Data mining enables evaluators to use their current reporting capabilities to uncover and understand

hidden patterns in vast databases. These patterns are then built into data mining models and used to predict individual behavior with high accuracy. As a result of this insight, institutions are able to allocate resources and staff more effectively. Data mining may, for example, give an institution the information necessary to take action before a student drops out, or to efficiently allocate resources with an accurate estimate of how many students will take a particular course. Thus, there is need to train evaluators in data mining usage for quality assurance. When educators are trained they will be equipped formally, to evaluate teachers correctly and effectively using accurate data. Evaluation is providing information to make decision about the product or process. The quality assurance approaches are defining quality, measuring quality and improving quality using data obtained. There is need to train evaluators and accredit evaluators on the role and competency needed in evaluating. Training can be done using on the spot check, professional development, group discussion and practical services. Educators are certified, by award of certificates after the training. Quality assurance helps evaluators to improve quality through continuous study and modification of services provided. It seeks to prevent, detect and correct problems in quality of services provided to individual and population. Quality assurance training helps to ensure that all training delivery and training environment meet appropriate standard. It helps in effective monitoring and evaluation of training plan. Training of evaluators can be used to ensure competency based on qualification. The training can be used to award certificate. It can be used to improve skill tests. It can be used to implement test competency. Quality assurance functions in some mechanisms. The mechanisms are normative mechanism and voluntary mechanism. The normative mechanism involves licensing curricula and qualification requirement, skill demonstration, financing and evaluation. The voluntary mechanism involves quality management, recommendation and quality award.

6. Conclusion

Adult education contributes immensely to advances in nation building. The healthiness of any nation is the developmental strength and capability of her citizen. Adult learners are perceived as great assets in any nation, hence, they need to be taught and equipped with state-of-the-art technology to position them in meeting the demands of the changing world of work. The application of data mining in keeping students' records can help achieve higher institutions' objectives. Thus, the application of data mining is considered a top priority in a bid to track students' height of achievement. For scientific and technological development of this group of learners in higher education departments data mining is needed. Its application in keeping adult learners' record can also help to uncover hidden pattern of learning and achievement by using classification technique to breakdown students' record.

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