

INTEGRATION OF LEARNING MANAGEMENT SYSTEMS IN BASIC STEAM EDUCATION IN NIGERIA

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Abstract

Basic Science, Technology, Engineering, Arts and Mathematics (STEAM) education is a relatively new construct in the field of education and is yet to be adequately integrated into the basic education curriculum in Nigeria. The precursor construct, STEM too has not been effectively and efficiently taught with technology and reflective thinking. Thus, this paper reviewed literature on basic STEAM education, the integration of Learning Management System (LMS) to enhance, enable, enrich and empower both the learners and the instructional facilitators in active engagement and interactivity. LMS premised on the constructivists' and behaviourists' learning theories which spur the learners of basic STEAM education. into activities embedded in appropriate Instructional System Design (ISD) which succinctly package STEAM education contents into modules intersperse with videos, games, assignment, quizzes, forum discussion, collaboration, analytics, online synchronous tele-conferencing and Immediate Knowledge of Results, (IKOR). Empirical evidences available signal that integrating LMS into basic STEAM education would enhance, enrich, enable and empower the learners' affective, cognitive and psychomotor domains of learning outcomes. Therefore, the paper suggests that all educational stakeholders hands should be on deck to fashion a new STEAM education curriculum integrated with LMS.

Keywords; STEAM education, Basic STEAM education, Learning Management System (LMS).

Introduction

Science, Technology, Engineering, Arts and Mathematics (STEAM) have never been taught integrally in Nigeria. Scientists, technologists, engineers, artists and the mathematicians are independent specialists in their respective fields solely researching and developing individual areas of human endeavour without consideration for joint and consensus integrated approach of the various fields to be taught together. Often, the issues in nature that scientist find unsolvable, they beckon on the

technologists, when it proves unyielding, engineers are consulted, if the issue persists, the artists and the mathematicians, none of the professional seem fit to possess the needed integrated skills to tackle the issues in the social-cultural context of nature. The orientation these professionals had towards nature from the Basic education was disjointed and weighing the STEAM teaching and learning in Nigeria on the Next Generation Science Standard (NGSS) of National Science Teaching Association (NSTA) in America that science teaching and learning should be done technologically and with reflective thinking, it is apparent that a great gap exist between what is expected and observed in STEAM education. Worthwhile, changes in he contents and methodology of instruction will invariably transform the educational objectives as well as the evaluation strategies for teaching and learning in STEAM (Olagunju & Adesina, 2017; Adebisi, 2019; Obanya, 2021; Okebukola, 2021).

When Science, Technology, Engineering, Arts and Mathematics (STEAM) are taught integrally and technologically right from the basic level of education, developing the 21st century skills – the 4cs – creativity, critical thinking, communication and collaboration along self-regulation, knowledge construction and real world problem solving will be easy to develop in the learners, most especially when done technologically with reflective thinking (NSTA, 2012; 2020), with diversities in the available technologies to aid teaching and learning in schools, many are disillusioned and become apathetic on which devices or technologies to select and how to adapt it for STEAM education. However, the advent of Learning Management Systems has a panacea on this. What then is STEAM education? What is Learning Management Systems (LMS)? And how can LMS be integrated into Basic STEAM education? These and many questions shall be answered in this article.

Meaning of STEAM Education

STEAM education is that kind of education that instills in the hearts of the recipients the amalgamated

Science, Technology, Engineering, Arts and Mathematics education in a holistic approach, STEM, Science, Technology, Engineering and Mathematics education without Arts is still incomplete since the world in the 21st century is a dynamic world, a resilient, ever changing world with STEM, the curiosity and creativity skills from the critical thinking skills, collaboration at a global level needs aesthetic design and manipulative skills in Art subjects like Social Studies, Fine and Applied Arts, Music and others. STEAM fields are described by Razi and Zhou (2022) when quoting Tsupros, Kohler, and Hallinen (2009) described STEM education as an interdisciplinary approach to learning, in which rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise, enabling the development of STEM literacy and with it the ability to compete in the new economy.

STEAM education is highly expedient in the 21st century in order to prepare the students for the present and future challenges of environmental issues by exposing them to these subjects that when critically understood enhances environmental sustainability. Science, Technology, Engineering, Arts and Mathematics holistically develop learners' curiosity, critical thinking skills, collaboration, communication, knowledge construction, self-regulation, real world problem solving and creativity skills. The skills developed through STEAM education can aid problem solving ability of the students which invariably allay cogs at the wheel of individuals and national progress. STEAM education has evolved into a meta-discipline, an integrated effort that removes the traditional barriers among the five subjects and instead focuses on innovating and applying the design of solutions to complex contextual problems using current tools and techniques (Odell, 2014).

STEAM is instrumental for the attainment of the Sustainable Development Goals (SDGs). It fosters critical thinking skills, creativity, effective communication skill, collaboration, self-regulation, knowledge construction and real world problem-solving skills development in learners (Akintola, 2019). Learning and teaching STEAM at all levels of education taking into consideration the new normal must emphasize entrepreneurship and self-sustenance as learning outcomes (Vanguard, Nov. 4, 2021).

STEAM education would instill in the recipients the true nature of teaching respective Science, Technology, Engineering, Arts and Mathematics in both knowledge acquisitions and skills development which will invariably enhance the learners' entrepreneurial skills, building capacity for self-reliance and self sufficiency in world of works. STEAM education is to be taught and learnt at all levels of education. Crafting STEAM education at the tertiary institution without the foundational knowledge, skills and aspirations at the basic educational (primary and the junior secondary school education) is tantamount to mere nomenclature or man's attempt to deceive self. While the future of STEAM education seems glowing and captivating with high propensity of instilling the 21st century skills that have the tendency to halt the menace of unemployment, underdevelopment and over-dependence on the western world, solid basic education becomes sacrosanct for STEAM outstanding attainment. Amalgam of arts to STEM will enhance the development of the 21st century skills.

All educational stakeholders have significant roles to play. The learners, the parents, the teachers, the school management, curriculum planners, the government, must have their hands on deck to enhance STEAM education. For instance, Lagos State has reaffirmed its commitment to remain a model in Science, Technology, Engineering, Arts and Mathematics (STEAM) education at all levels for other states in the federation. The Commissioner for Education stated that enhancing STEAM education in the State is aligned with the Governor educational agenda of all teachers irrespective of the subjects taught to key-in into the use of technology and thus provided the in-service teachers with professional development programme to enhance their skills in technological aided instructions. The State government equally provided technological devices and internet connections to the schools for efficient and effective STEAM education (*Tribune*, August 31, 2021).

The Nigeria Academy of Education (NAE, 2021) made a major push for the institutionalisation of STEAM on the fulcrum for teaching and learning in Nigeria schools by making STEAM education the main focus of the 35th Annual Congress of their association (Vanguard, November 4, 2021). The congress exemplified the intricacies in STEAM education, the need for STEAM curriculum and professional development for teachers to meet the demand for STEAM education in the nation. The best level to commence STEAM education is the foundational level which is the basic level of education, however, to supply the manpower

(teachers) needed for STEAM education at the basic education level, tertiary institutions should first develop and implement STEAM education curriculum for instructional facilitators availability in schools.

Basic STEAM Education

Basic education in Nigeria focuses on solid foundational education from the Early Child Care and Development Education; Pre-primary Education; Primary Education to the Junior Secondary Education given to children aged 0-15 years (National Policy on Education, 2013). The essence of Basic education is to provide the background knowledge and skills to prepare individual for further education on skills acquisition in technical and vocational studies. Thus, a Basic education is a prerequisite for efficient and effective STEAM educational implementation both at the inception level the tertiary level of education. A functional basic STEAM education would prepare the young minds with scientific, technological, engineering, arts and mathematical orientations that would enhance comprehensive and holistic understanding of STEAM field in a pragmatic and heuristic approach.

Basic STEAM education would expose the young minds to early integration of the construct STEAM, linking and applying the acquired science, technology, engineering, arts and mathematics ideas, knowledge, skills and attitudes to their immediate world, curiously and critically thinking about the nexus of the five fields and their local applications to create ideas, more products to solve the local problems. Since the Basic STEAM education would be taught in a hypothetico-deducative model, hands-on-mind-on laden with technology, the young minds in basic education would be able to perceive the inter-connectivity and the inter-relatedness of the five subjects - Science, Technology, Engineering, Arts and Mathematics, a platform that will predispose them to creative thinkers, critical minded learners, collaborative explorers of the environment and eventual fabrication of essential and economical products.

The nature of STEAM is always theoretical and practical in form, as well process and product nature. Early exposure of the construct, STEAM to the students would empower them to, not only master the knowledge in STEAM, the theories, facts concepts laws and privileges in science but being pragmatic to utilize such scientific, technological, engineering, arts and mathematical ideologies to build products or structures or fabricate machines for solving making issues.

For efficient and effective implementation of Basic STEAM education in Nigeria, early exposure of the young minds to technological application software is imperative. If all nations now dwell in the global village, interdependent and interrelating and the advanced nations of the world like China, Britain, Italy, Germany, Singapore, Finland, United States of America and others integrate technology in their Basic education it would be inimical and non-progressive for Nigeria not to adhere to the recommendation of the National Science Teaching Association (NSTA) that the Next Generation Science Standard (NGSS) for teaching and learning science and allowed subjects (Science, Technology, Engineering, Arts and Mathematics) with technology and reflective thinking (NSTA, 2012, 2020), Technology integration in Basic STEAM education enhances learners' learning outcomes (Badmus, 2013; Olagunju & Adesina, 2017; Okebukola, 2021, Gambari, 2021), grabs learners' attention and positive disposition to learning (Olagunju, Bolaji & Adesina, 2013; Adebisi, 2019; Obanya, 2021), provides repetitive, untiring access to ideas, knowledge, skills in STEAM (Adesina, 2015; Adebisi, 2019, Obanya, 2021). A prolific, multifunctional application software that can enhance, enrich, enable and empower both the learners and the instructors of Basic STEAM education is Learning Management System (LMS).

Learning Management Systems (LMS)

Learning which is a construct of a relatively-permanent change in behaviour as a result of experience or practice (Olagunju & Ige, 2013; Adesina & Adesina, 2018; Obanya, 2021). A learning that is not owing to practice or experience can hardly it be relatively-permanent in the learner. Management is a construct that entails efficient and effective utilization of the available resources to achieve the pre-stated goals or objectives. A system connotes a sequential arrangement of many parts working scientifically to attain common purpose. Thus, a learning management system is a system, sequentially and technologically packaged to manage learning by presenting already structured instruction with instructional enhancement facilities. Course contents are packaged using Instructional System Design (ISD) in modules of Learning Management System (LMS).

Instructional System Design (ISD) provides model for a step-by-step process that helps instructional facilitators plan and create instructions to ease learners and instructors mutuality, interactivity and engagement (Gambari, 2021; Nguyem, 2021;

Tautigurrichman, Muslimin, Rofki and Ahah, 2019). A good example of such ISD is ADDIE- Analysis, Design, Development, Implementation and Evaluation. Analysis involves research and the skills required to conduct a good instructional analysis are similar to those of any good investigation: thoroughness, objectivity, and a systematic approach. The design phase is the planning stage of ISD. Its purpose is to transform relevant content into concise, behavioural objectives, creating the instructional "blueprint" that will direct the development of all training materials, tests and methods. The development phase translates design decisions into training materials. This is where the real work of course development is done. Using the objectives, instructional approach, and media selections from the design phase, development produces course materials for the trainer, course materials for the trainee, and the evaluation instruments.

The implementation phase focuses on the details of training delivery. Logistical arrangements, such as scheduling a training place, preparing an agenda, setting up the training environment and even practising the presentation ensure delivery of a training session that captures trainee interest. The evaluation is to ensure that training-under-development stays on track, safeguarding achievement of training goals. Decisions about revisions for future course iterations can be made after evaluating the strengths and weaknesses in a completed training programme. Finally, evaluation ensures that training improves performance back on the job. The ISD process includes formative and summative evaluation.

A typical learning management system has inter-phases for instructional contents uploads (modules), inter-phases for reflection in assignments, quizzes, forum, discussion, hang-out, collaboration, analytic, announcement, online conferences and many others internet stimulating facilities. On a typical learning management system, audio, video, audio-visuals can be embellished on the technological application software. Games, locally made or foreign can equally be embellished on the learning management system, the confirmation of a learning management system is such in a comprehensive pattern to capture and sustain learners' attention, interaction, attitudes learning, such which are positive precursors to enhanced learning outcomes (the attitudinal, psychomotor and the cognitive). Common LMSs for effective and efficient integration to Basic STEAM education are canvas

instructure, moodleXperienify, GyrusAim, Knolyx, Cornerstone Learning, LearnUpon LMS, 360 learning, Go Skills, LearnWorlds, Decebo, formative, LMS Talent and many other too numerous to enlist on a singular paper (Tautigurrichman, Muslimin, Rofki & Ahah, 2019).

Integration of Learning Management Systems in Basic STEAM Education: A Priori

Theoretically, LMSs are premised on the constructivists' learning theory of Glersefeld, Vygostky, Bruner, Dewey (Ehinder, 2014) that suggests that learners construct knowledge out of their experiences. Bruner (1986); Gagne (1985) and Piaget (1973) believed that such knowledge constructed would find useful links with previous ones and utility LMS is a technological package that employed instructional design like ADDIE (Analysis, Design, Development, Implementation and Evaluation). The succinct design of the instruction in LMS proceed on enquiry mode where questions are presented, prompting thinkability and reflections on the identified learning objectives that aids knowledge construction. The LMS allow the learners to learn, re-learn, over-learn and debug (de-learn) inconsistency in learning. It allows the process of assimilation of facts along with accommodation of new learning ideas in the course (Dewey, 1939). LMS sustains learning interest to the extent that the learners can decode the encoded instruction and construct such in their own ideas which makes their learning relatively-permanent as they change their behaviour (learning outcomes).

Theoretically, the integration of learning management system into Basic STEAM education is also premised on the behaviourists' learning theory which states that learning is a behavioural pattern structured in Stimulus–Organism–Response pattern. Normally, the learning management system presents an unconditional stimulus which rationally produces an unconditioned response when interpreted, the learning management system packaged STEAM contents instruction using ISD like ADDIE (Analysis, Design, Development, Implementation and Evaluation) to present STEAM to basic learners, as such would facilitate and enhance learners and facilitators with high interactivity and engagement (Gambari, 2021; Nguyen, 2021).

Conceptually, the integration of learning management system into basic STEAM education is configured into a structure of the learners interacting in hands-on-

mind-on mode with instructional system designed modules, quizzes, assignment, instructional videos, games, forum discussion, collaboration and other features of the learning management system to

produce in the learners Self-regulation skills, collaboration skills, engagement skills, interactivity, critical thinking skills, creativity, effective communication, Knowledge construction and Real-world problem solving in Basic STEAM education.

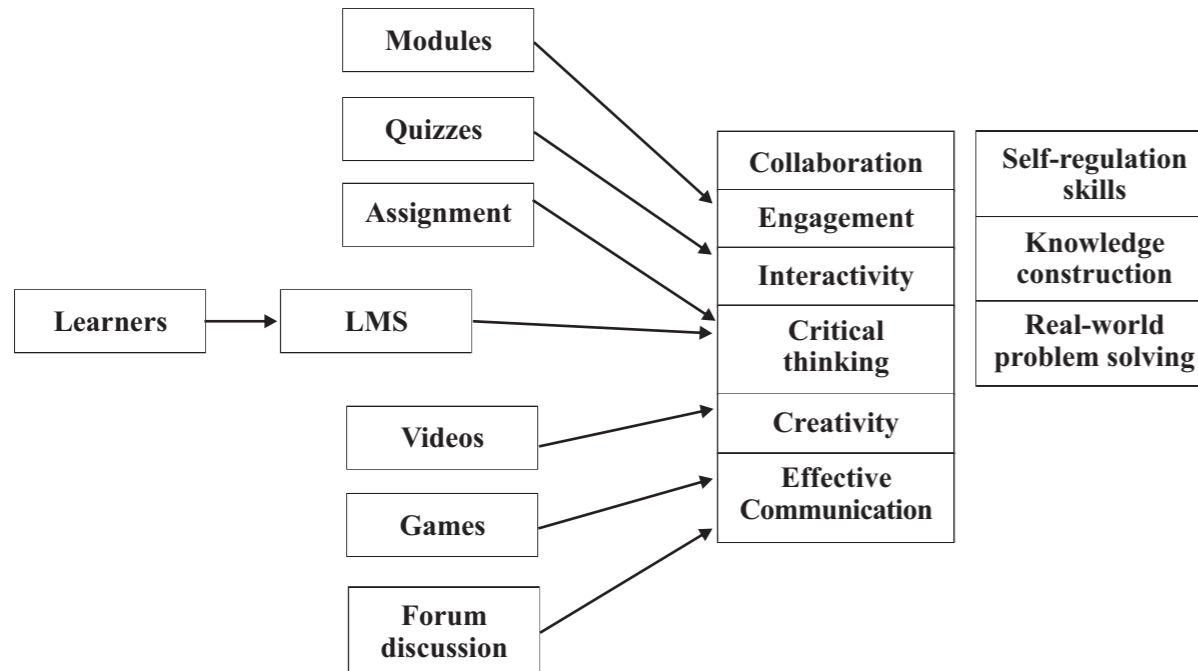


Fig. 1: Conceptual Framework of Learning Management System
Source: Author (2022)

Figure 1 portrays the integration of learning management system in Basic STEAM education, Learning Management System LMS. It has multifunctional interphases for instructional modules, quizzes, assignments, videos, audios, games, forum discussion that stimulate and sustain the interest of learners and foster learners' interactivity and engagement that enhances learners' creativity, critical thinking, communication skills, collaboration, knowledge construction, self-regulation and real problem solving skills.

Empirically, Dube and Scott (2014), in an empirical study on the use of the Sakai Learning Management System (LMS), case of NUST, Zimbabwe found that Learning Management Systems (LMSs), computer programmes used to create, manage, deliver and retrieve learning content such as Sakai can raise the learners skills in ICTs.

Al-Assaf, Almarabeh and Nasir Eddin (2015). Study on the Impact of Learning Management System on Students of the University of Jordan. The results of this study confirm the original TAM's findings and reveal that the faculties of students and number of previously E-learning courses have an influence on perceived ease of use and perceived usefulness while the level of the academic year and GPA have no

significant influence on perceived ease of use. Also, the use of LMSs raised the students' computer operation skills. DeOliveira, de Almeida and Nakayama (2016) examined LMS and e-learning management; an integrative review and research agenda found that LMS allow communication and interaction between teachers and students in virtual spaces which build ICT skills in the learners as well as 21st century skills when integrated in STEAM education.

Holmes and Prieto-Rodriguez (2018) studied student and staff perceptions of a LMS for blended learning in teacher education focusing on accessibility and interactivity of the LMS. A descriptive survey design was adopted for the research. Forty-six members of staff and 470 undergraduate and postgraduate faculty of education students from the Faculties of Education were sampled. Differences were found between student and staff perspectives in relation to accessibility of online materials, with students rating its contribution to their learning higher than staff. However, the two groups held similar perspectives with regards to the effectiveness of LMS tools to enable interactivity. The results further revealed the importance of the key choices made by teaching staff in deciding which LMS tools to use in order to maximise student participation and learning.

Taufiqurrochman, Muslimin, Rofiki and Abah (2019) described students' perceptions as users of the LMS application. The study was a descriptive research. Of the 150 students involved in this study, 75 percent chose the blended learning model for learning Arabic. The results of students' perceptions regarding these features indicate that they understand all the functions of the LMS features. About learning Arabic, they assessed that all LMS applications had the potential to be used for learning Arabic. The most significant potential is the ability of the LMS application in enhancing learners speaking, writing, and grammar capabilities.

Nguyen (2021) in a study on satisfaction of users towards learning management system at international University e Vietnam National University HCMC found that there is significant impact of LMS on students' learning satisfaction including improved interaction and relationships building and sustenance in lesson and an invariable increase in perception of LMS effectiveness. Kant, Prasad and Anjali (2021) researched into selecting an appropriate learning management system in open and distance learning: a strategic approach identified that LMSs are of various types and sources and makes the decision-making as regards selection of an appropriate LMS strategically is crucial, requiring adequate consideration of every aspect such as cost, quality, usage, capacity, budget and most importantly priorities and objectives and the students and instructional facilitators perceived that LMS impacts positively on learning outcomes.

Al-Sharhan, Al-Hunaiyyan, Alhajri and Al-Huwail (2021) explored the utilization of Learning Management System (LMS) among instructors and students. It was a case study conducted to identify the utilization of LMS in the Gulf University for Science and Technology (GUST). The results indicated a low percentage of the utilization of LMS functions, in which web-based LMS is more utilized than mobile-based LMS and found that when LMS is used as a pedagogical tool rather than as an administrative one. The students performed better and perceived the software as more efficient and effective instructional package.

The Challenges of Integration of LMS in Basic STEAM Education

As expedient and paramount the integration of Learning Management Systems (LMSs) in Basic STEAM education is, the new, novel paradigm is beset with host of surmountable challenges among which are:

Lack of ICTs technical knowledge and skills: many teachers lack the requisite knowledge and skills of ICTs to be integrated in education. The use of

PowerPoint projectors, the mobile learning, social media, Learning Management Systems (LMSs), Massive Open Online Courses (MOOC), Open Educational Resources (OER) and many ICT knowledge and skills are deficient in many teachers impairing and marring their integration of the innovative ICTs in education.

Attitudinal barriers: as a result of problems with staff in an organisation. These may be brought about, for example, by such factors as poor management, lack of consultation with employees, personality conflicts which can result in people delaying or refusing to communicate, the personal attitudes of individual employees which may be due to lack of motivation or dissatisfaction at work, brought about by insufficient training to enable them to carry out particular tasks, or just resistance to change due to entrenched attitudes and ideas.

Psychological factors: such as people's state of mind. People all tend to feel happier and more receptive to information when the sun shines and in bright mood, conversely, bad administration, poor governance or management may dampen and inhibit the psychological zeal of workers to imbibe innovations in ICTs.

Inadequate resources: ICT gadgets availability can trigger inquisitiveness to learn its integration in teaching and learning. Novice lecturer in an ICT-compliant lecture room would be prone to acquire the skills and competency towards imbibing requisite disposition in adapting ICTs in class, conversely, when the lecturer is ICTs savvy but lectures in non-ICT-compliant lecture room.

Misperception of ICTs integration in education: the people's perceived normality, subjective conception and perceived behavior about ICTs integration in education often focus on workers displacement from job and as much as their misperception remains unchanged, ICTs utilization by such individuals remains a mirage.

FUD factors (Fear, Uncertainties and Doubts): The situations lecturers found him or herself predispose individuals to fear, uncertainties and doubts. the acceptance and utilization of ICTs in teaching and learning not exempted. Many lecturers still are apathetic about the efficacy of ICTs in education as many still doubt the fact that the conventional instructional strategy which is didactic in nature is already dated and archaic; many are still unsure and uncertain of the modality to integrate ICTs into

teaching and learning for optimum production.

Conclusion

Science, Technology, Engineering, Arts and Mathematics (STEAM) education ought to be taught right from the Basic education level with technology and reflective thinking. Learning Management System (LMS) as a technological application software enhances and empowers the learners and instructional facilitators interactivity and engagement. Integrating Learning Management System in STEAM education is a positive step in the right direction. The STEAM educational instruction should be appropriately designed using Instructional System Design (ISD) like ADDIE for effective teaching and learning of STEAM. LMS integration into STEM education will raise the learner's cognitive, affective and psychomotor domains in STEM which invariably will promote the 21st century skills in learners.

Suggestions

For effective and efficient integration of learning management system in Basic STEAM education, the following are suggested;

1. Ministry of Education, the Commissioner of Education, the Director of Education and other educational principal officers should organise workshops, seminars, symposia for the teachers at all levels on the integration of learning management systems in basic STEAM education;
2. Curriculum planners should plan and build new curriculum for basic STEAM education, one that will emphasise the crosscutting concepts in STEAM for 21st century skills development in learners;
3. Ministry of Education along with the Teaching Service Commission should encourage Public-Private Partnership towards integrating technology like LMS in basic STEAM education

References

- Adebiyi, K. A. (2019). *Pragmatic approach to effective lesson delivery in STEM*. A Keynote Address Presented at A Day Workshop of Science Teachers Association of Nigeria, Oyo State Branch at Islamic High School, Basorun, Ibadan, October 22.
- Adesina, A. E. (2015). *Effects of computer assisted instructions on pre-service teachers' learning outcomes in Agricultural Economics concepts in Colleges of Education in South-West, Nigeria*. A Ph.D. Thesis submitted to the Department of Teachers

Education, University of Ibadan, Ibadan.

- Akintola, D. A. (2019). *Roles of STEAM knowledge and teacher education programme on achieving Sustainable Development Goals*, <https://www.researchgate.net/roles-of-steam-knowledge-and-teacher-education-programme-on-achieving-Sustainable-Development-Goals>.
- Al-Assaf, N., Almarabeh, T. Nasir Eddin, L. (2015). A Study on the Impact of Learning Management System on Students of the University of Jordan. *Journal of Software Engineering and Applications*, 8 (11), 34-41 DOI:10.4236/jsea.2015.811056.
- Al-Sharhan, S., Al-Hunaiyyan, A., Alhajri, R. & Al-Huwail, N. (2021). Utilization of Learning Management System (LMS) Among Instructors and Students, *Springer Journal*, https://doi.org/10.1007/978-981-15-1289-6_2.
- Badmus, A. M. (2012). *Development and evaluation of a webquest application on educational technology concepts for selected undergraduate students in Nigeria*. A Ph.D. thesis, Department of Science Education, University of Ilorin, Nigeria.
- Bruner, J. S. 1986. *Actual minds, possible world*. Cambridge, M. A.: Harvard University Press.
- De Oliveir, P. C., de Almeida, C. J. C. and Nakayama, C. M. K. (2016). Learning management systems LMS and e-learning management; an integrative review and research agenda. <https://doi.org/10.4301/S1807-17752016000200001>
- Dube, S., & Scott, E. (2014). An empirical study on the use of the Sakai Learning Management System (LMS): Case of NUST, Zimbabwe. *Proceedings of the e-Skills for Knowledge Production and Innovation Conference 2014, Cape Town, South Africa*, 101-107. <http://proceedings.e-skillsconference.org/2014/e-skills101107Dube851.pdf>
- Ehindero, S. (2014) *Intellectual foundations of curriculum development, implementation and innovation*. Sango Otta : Melrose Publishing Company Limited.
- Federal Republic of Nigeria (2013). *National Policy on Education*. Abuja; Nigeria Educational Research Development Council.
- Gagne, R. M. (1985). *The conditions of learning and theory of instruction* (4th Edition). New York: CBS College Publishing.
- Gambari, A. I. (2021). *Adopting 21st century global*

best practices through innovative technology integration in education. A Lead Paper

- Presented at the International Conference and Workshop on Innovation, Technology and Education Organised by AITIE, August, 9th- 13th
- Holmes, K. A. & Prieto-Rodriguez, E. (2018). Student and staff perceptions of a learning management system for blended learning in teacher education. *Australian Journal of Teacher Education*, 43 (3), 20-34.
- Kant, N., Prasad, K. D & Anjali, K. (2021). Selecting an appropriate learning management system in open and distance learning: a strategic approach. *Asian Association of Open Universities Journal*, <https://doi.org/10.1108/aaouj-09-2020-0075>.
- Nguyen, N. (2021). A study on satisfaction of users towards learning management system at International University Vietnam National University HCMC, *Asia Pacific Management Perspectives*,