GRADIVA

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Development of a Learning Management System in Microsoft Excel for Students in Universities

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Abstract

This study focused on the development of a Learning Management System (LMS) in Microsoft Excel aimed at improving spreadsheet instruction specifically for students in universities. The motivation stemmed from persistent challenges, including limited classroom time and recurring academic disruptions, which negatively impact students' ability to acquire practical Excel skills. The LMS development was grounded in two educational theories—Constructivist Theory and Action Theory—ensuring that the system supports active, self-directed, and contextually meaningful learning experiences. Employing a Research and Development (R&D) design, the LMS was developed through a systematic six-phase process that incorporated input and collaboration from key stakeholders, including Computer Education lecturers, software developers, and final-year students across three federal universities in Nigeria. Data collection instruments, including questionnaires and achievement tests, were rigorously validated and showed high reliability, with Cronbach's alpha coefficients of 0.79 and 0.80 for the lecturer and expert questionnaires respectively, and a Kuder Richardson 21 reliability of 0.79 for the student assessment test, indicating strong internal consistency. Analysis of collected data using descriptive and inferential statistics demonstrated that the LMS effectively integrated necessary learning activities and various delivery systems. Expert evaluations rated the system highly in usability, scalability, and alignment with the curriculum. Importantly, student performance improved significantly following LMS use, with a mean gain of 3.43 points from pre-test to post-test scores. The study concludes that this Microsoft Excel LMS is a robust, scalable educational tool and recommends its adoption by higher education institutions to address gaps in spreadsheet instruction and enhance students' practical competencies.

Keywords: *Learning Management System, MS-Excel, Software Development, Personalized Learning.*

1) INTRODUCTION

The integration of technology in higher education is essential for cultivating practical skills in computer education students. Microsoft Excel, a prevalent spreadsheet tool, is vital in data management, analysis, and problem-solving across diverse industries. However, changes in academic calendars and limited classroom time in Nigerian colleges typically impair students' acquisition of hands-on Excel skills. Learning Management Systems (LMS) provide a versatile platform for administering practical, curriculum-aligned instruction beyond conventional classroom environments to tackle these difficulties. This study details the creation of a Microsoft Excel-based Learning Management System (LMS) intended to improve

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

computer education for university students in Southeast Nigeria, with the objective of reconciling curriculum demands with industry standards through accessible, interactive, and skill-focused learning experiences.

1.1 Learning Management System (LMS)

A Learning Management System is a software platform designed to deliver, manage, and assess educational content, facilitating both instructor-led and self-paced learning. LMSs provide a centralized environment for course management, resource sharing, assessment, and communication, often incorporating multimedia tools such as video, audio, and interactive modules (Haris, 2017; TalentLMS, 2016). In the context of spreadsheet education, an LMS can bridge the gap between theoretical instruction and practical application by offering students the opportunity to engage in simulated exercises, receive immediate feedback, and progress at their own pace1. The flexibility of LMS platforms is especially valuable in environments where academic schedules are unpredictable and student learning speeds vary widely (Philippo & Krongard, 2012).

1.2 Software Development

The creation of an effective LMS is underpinned by robust software development practices. The Agile model, adopted in the referenced study, emphasizes iterative, user-centered design and continuous stakeholder feedback, ensuring that the evolving needs of educators and students are met efficiently (Sami, 2012; Highsmith & Cockburn, 2001). Software development for educational technology involves stages such as requirements analysis, design, coding, testing, and validation, each aimed at producing a system that is reliable, scalable, and adaptable to changing pedagogical demands (Tutorialspoint, 2015; IA, 2016). The incorporation of features such as browser compatibility, extensibility, error handling, and multimedia support is essential for maximizing the accessibility and effectiveness of the LMS.

1.3 Microsoft Excel

Microsoft Excel is the industry-standard spreadsheet application, renowned for its versatility in data management, analysis, and visualization (French, 2018; Broman, 2017). Its functionalities range from basic data entry and calculation to advanced statistical analysis, charting, and automation through macros. Excel's widespread adoption in academia and industry underscores the importance of ensuring that graduates are proficient in its use (OpenGate, 2018; Boogaard, 2018). The referenced study highlights the need for practical, curriculum-aligned instruction in Excel, delivered through an LMS that supports active learning, immediate feedback, and the development of both foundational and advanced skills.

1.4 Theoretical Framework

This study is anchored by two fundamental educational theories—Constructivist Theory and Action Theory—which inform the creation of the Microsoft Excel-based Learning Management System (LMS) for computer education students in Southeast Nigeria. The Constructivist Theory, which is rooted in the work of Jean Piaget, states that learners actively develop their own understanding and knowledge of the world via experiences and reflection. Rather than passively accepting information, pupils develop mental models (schemas) that are regularly modified through the processes of assimilation and accommodation. In the context of an LMS, constructivist concepts are operationalized through sequential module structure, allowing students to advance through content in a logical, cumulative manner; course

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

calendars, which assist learners in organizing their study schedules and managing time wisely; multimedia material, which accommodates varied learning methods and promotes comprehension; and interactive features such as discussions, blogs, and assignments, which stimulate active engagement and deeper learning. By incorporating these features, the LMS supports self-directed learning and the building of personally meaningful information, harmonizing with the constructivist emphasis on experience-driven understanding.

The Action Theory, on the other hand, is inspired by the work of Vygotsky and Leont'ev and emphasizes that learning is an active, deliberate activity mediated by tools—both physical and psychological. In educational technology, this translates to the use of digital platforms as instruments that support intentional, goal-oriented learning activities. The LMS is meant to provide a range of authentic, activity-based exercises that replicate real-world spreadsheet use, thereby fostering the development of both technical abilities and higher-order thinking.

By blending Constructivist and Action Theories, the LMS addresses the challenges of uneven academic calendars, different learning paces, and limited practical exposure in Nigerian universities. The system is designed to enable active, customized, and collaborative learning, ensuring that all students—regardless of their starting point—can acquire the key skills needed for effective use of Microsoft Excel in academic and professional settings.

1.5 Research Gap

Despite Microsoft Excel's widespread popularity as a vital tool for data analysis, calculation, and information management, major hurdles exist in ensuring that university students in computer education programs gain adequate competency in its use. While curricula in Nigerian colleges include complete spreadsheet management courses encompassing basic to advanced Excel skills, various institutional impediments inhibit optimal learning results.

First, the erratic academic calendar in Nigerian public universities typically interrupts instructional continuity, restricting opportunities for students to participate in continuous, hands-on practice required for acquiring Excel's practical applications. This time constraint is worsened by the demands of other courses, resulting in insufficient exposure to practical exercises even when practical sessions are nominally included in the curriculum.

Second, diversity in student learning pace further complicates the situation. Students with faster assimilation rates gain more from fewer practical sessions, whereas those who require longer time and support are typically left behind. As a result, many students complete their Excel courses without developing the essential abilities for efficient application in professional or academic environments.

Consequently, a gap grows between curriculum expectations and actual student competencies, prompting some students to seek pricey external refresher courses, while others forsake further Excel learning owing to resource restrictions. Existing educational approaches and resources do not effectively address these discrepancies or provide opportunities for individualized, self-paced learning outside the classroom.

Despite the recognized relevance of Microsoft Excel expertise, there is a paucity of specialised Learning Management Systems (LMS) specifically developed to facilitate spreadsheet education for computer education students in Nigerian colleges. Such solutions could offer flexible, accessible, and tailored learning routes, enabling students to practice and acquire Excel skills at their own pace, regardless of disruptions in the academic calendar or variances in learning speed.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Therefore, this research tackles a major gap by building a Microsoft Excel-based LMS matched with the spreadsheet curriculum for computer education students in Southeast Nigeria, seeking to accelerate skill development and bridge the disparity between curricular intent and actual student outcomes.

1.7 Purpose of the Study

The main purpose of this study is the development of a Learning Management System (LMS) on Microsoft Excel for computer education students in Universities.

Specifically, the study seeks to:

1. Determined the learning activities required in developing the Learning Management System (LMS) on Microsoft Excel for Computer Education students in Universities in South East, Nigeria.
2. Determined the delivery systems required for developing the Learning Management System (LMS) on Microsoft Excel for Computer Education students in Universities.
3. Developed a Learning Management System (LMS) on Microsoft Excel for Computer Education students in Universities.
4. Validated the developed Learning Management System (LMS) on Microsoft Excel for Computer Education students in Universities.
5. Determined the effectiveness of the developed Learning Management System (LMS) on Microsoft Excel for Computer Education students in Universities.

2. METHODS

2.1 Design of the Study

This study adopted the Research and Development (R&D) design, which is well-suited for the systematic creation and refinement of educational products and procedures. According to Gall, Gall, and Borg (2007), R&D design involves a series of investigative activities aimed at improving existing solutions or developing new ones to address identified educational needs. The primary objective of this study was to develop a Microsoft Excel-based Learning Management System (LMS) tailored for undergraduate computer education students in universities in Southeast Nigeria.

While the traditional R&D model comprises ten steps, this study streamlined the process by focusing on six critical phases, ensuring both methodological rigor and practical feasibility. The phases, adapted from Gall, Gall, and Borg (2007), are as follows:

1. **Identification of Goals for the Instructional Programme:**

   The initial phase involved defining the overarching aims of the instructional programme, with a focus on equipping students with practical and theoretical competencies in Microsoft Excel relevant to their academic and professional pursuits.

2. **Instructional Analysis:**

   This phase entailed a detailed breakdown of the specific skills, procedures, and learning tasks required to achieve the instructional goals. The analysis helped in identifying content areas, sequencing of topics, and the depth of coverage needed for effective learning.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

3. **Development of Instructional Strategies:**

   Based on the instructional analysis, targeted strategies were formulated to support students in achieving the set performance objectives. These strategies included the integration of multimedia resources, interactive exercises, and self-paced modules to accommodate diverse learning preferences and paces.

4. **Translation of Needs and Goals into Performance Objectives:**

   The instructional needs and goals were articulated as clear, measurable performance objectives. These objectives served as benchmarks for both the design of instructional activities and the subsequent evaluation of student learning outcomes.

5. **Development of the Learning Management System:**

   The core phase involved the actual design and development of the LMS, incorporating the instructional strategies and content developed in earlier phases. The LMS was built to provide a structured, user-friendly, and interactive environment for learning Microsoft Excel, with features such as a course calendar, modular content, discussion forums, and assessment tools.

6. **Formative Evaluation through Validation:**

   The developed LMS underwent formative evaluation, including expert reviews and pilot testing with a sample of the target student population. Feedback from these evaluations was used to refine the system, ensuring its relevance, usability, and effectiveness in facilitating Excel learning.

To enhance the flexibility and responsiveness of the development process, these R&D phases were implemented in conjunction with the agile software development model. This allowed for iterative refinement based on continuous feedback from stakeholders and end-users.

By following this structured yet adaptable R&D approach, the study ensured that the resulting LMS was pedagogically sound, contextually relevant, and capable of addressing the unique challenges faced by computer education students in Universities.

2.2 Population and Sampling

The population for this study comprised a total of 130 participants, strategically grouped according to the phases of the research and development process. In Phase I, the population included 31 Computer Education lecturers from three federal universities in Southeast Nigeria—University of Nigeria, Nsukka (16), Nnamdi Azikiwe University, Awka (10), and Michael Okpara University of Agriculture, Umudike (5)—as well as 10 software developers drawn from Tenece Professional Services, Enugu (5), and the Management Information System (MIS) unit at the University of Nigeria, Nsukka (5). These participants contributed to the identification of instructional goals for the programme.

Phases II to IV involved the same 31 Computer Education lecturers, who participated in determining the learning activities, delivery systems, and evaluation techniques necessary for the development of the Learning Management System (LMS).

In Phase V, the population consisted of 10 software developers (5 from Tenece Professional Services and 5 from MIS, University of Nigeria, Nsukka) who were engaged in the unit testing of the LMS due to their expertise in software development.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Phase VI focused on 89 final-year Computer Education students—19 from University of Nigeria, Nsukka, 40 from Nnamdi Azikiwe University, Awka, and 30 from Michael Okpara University of Agriculture, Umudike—who participated in the beta testing and review of the LMS. Final-year students were selected for this phase as spreadsheet processing is typically offered at this level in Nigerian tertiary institutions.

A total population sampling technique was employed, involving all available participants in each group. This approach was deemed appropriate given the relatively small and well-defined population, thereby eliminating potential sampling bias and ensuring comprehensive representation across all phases of the study (Damico, 2016).

2.3 Instruments for Data Collection

Three instruments were utilized for data collection in this study: the Microsoft Excel Lecturers' Questionnaire (MELQ), the Microsoft Excel Expert Assessment Questionnaire (MEEAQ), and the Microsoft Excel Student Assessment Test (MESAT).

The **MELQ** was used in Phases I to IV to gather data from lecturers. It consists of two parts: the first collects respondents' personal data, while the second focuses on information relevant to LMS development. Part two is divided into four sections: objectives of the LMS (7 items), required learning activities (8 items), delivery systems (8 items), and evaluation techniques (7 items). Responses are rated on a four-point scale: Highly Needed (4), Needed (3), Slightly Needed (2), and Not Needed (1).

The **MEEAQ**, used in Phase V, gathered expert opinions on the suitability, compatibility, legibility, and navigation of the developed LMS. This 20-item questionnaire also uses a four-point scale: Excellent (4), Good (3), Fair (2), and Poor (1).

Finally, the **MESAT** was administered in Phase VI to assess students' academic achievement in Microsoft Excel using the LMS. It consists of 50 multiple-choice questions, developed based on approved curriculum topics and a researcher-constructed table of specification.

Certainly! Here is a slightly reduced and more concise version:

2.4 Validation of the Instrument

The Microsoft Excel Lecturers' Questionnaire (MELQ) was face validated by three lecturers from the Department of Computer and Robotics Education, University of Nigeria, Nsukka. The experts reviewed the instrument for clarity, relevance, and completeness, and their feedback was incorporated into the final version.

The Microsoft Excel Expert Assessment Questionnaire (MEEAQ) was validated by one lecturer from the same department and two web developers from the Management Information System (MIS) unit at the University of Nigeria, Nsukka. Their suggestions on legibility, compatibility, perceived usefulness, and ease of use were considered in the final development of the LMS.

The Microsoft Excel Student Assessment Test (MESAT) was both face and content validated by three lecturers from the Department of Computer and Robotics Education to ensure comprehensive coverage of the subject matter. Their input guided the refinement of the test items and the final version of the instrument.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Computer Education Lecturers provided data on objectives, learning activities, delivery strategies, and evaluation methods for LMS development. Five web development experts assessed the acceptability and technical adequacy of the LMS, while 89 final-year students participated in evaluating its effectiveness, as they are the intended end users.

Certainly! Here is a slightly reduced and concise version:

2.5 Reliability of the Instruments

The reliability of the Microsoft Excel Lecturers' Questionnaire (MELQ) was assessed by administering it to 10 lecturers from Enugu State University of Technology (ESUT) and 5 Microsoft Excel tutors from Prince Computers, Nsukka—both outside the study area. Using Cronbach's Alpha, the instrument achieved a reliability coefficient of 0.79, indicating good internal consistency.

For the Microsoft Excel Expert Assessment Questionnaire (MEEAQ), reliability was determined by administering it to 10 web developers from Dnelix Technologies, Nsukka. Cronbach's Alpha yielded a coefficient of 0.80, confirming strong consistency among the items.

The Microsoft Excel Student Assessment Test (MESAT) was administered twice, two weeks apart, to 50 final-year students from the University of Nigeria, Nsukka. Scores from both administrations were correlated using the Kuder Richardson 21 (KR-21) formula, resulting in a reliability coefficient of 0.79, appropriate for multiple-choice tests.

Procedure for Developing the Learning Management System

The LMS development followed six phases:

1. **Identification of instructional goals:** Objectives were gathered using the MELQ administered to lecturers.
2. **Instructional analysis:** Specific skills, procedures, and learning tasks were identified through questionnaire responses.
3. **Development of instructional strategies:** Delivery systems and strategies were formulated based on feedback.
4. **Development of assessment instruments:** Evaluation techniques were established for assessing student knowledge and performance.
5. **LMS development:** The system was designed, developed, and hosted online.
6. **Formative evaluation:** The LMS underwent validation by experts and trial testing with students to assess effectiveness.

2.6 Method of Data Collection

The MELQ was administered to Computer Education lecturers by the researcher, assisted by two trained research assistants who guided respondents in completing the questionnaire. Completed questionnaires were collected promptly after completion. The MEEAQ was distributed and collected directly by the researcher from the expert participants. For the MESAT, research assistants administered the test to students with the approval of the Microsoft Excel lecturers, and the scores were subsequently collated.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Trial Testing (Experimental Procedure)

During trial testing, the researcher controlled for several variables to ensure data quality:

- **Lecturer Variable:** The researcher coordinated the experiment with lecturers and research assistants, standardizing expectations to minimize variations in teaching methods.
- **Student Variable:** The researcher engaged with students and implemented mechanisms to support learning and performance.
- **Pre-test Sensitization:** Pre-test and post-test administrations were managed professionally, with test items re-shuffled to prevent familiarity.
- **Test Effect:** Tests were administered in a typical classroom setting to reduce test-taking anxiety.
- **Environmental Variable:** The test environment was made conducive, and students were adequately prepared to ensure reliable responses.

2.7 Method of Data Analysis

Data from the MELQ and MEEAQ questionnaires were analyzed using mean ($\bar{X}$) and standard deviation (SD), with a criterion mean of 2.50 set as the cut-off for agreement. Items with a mean of 2.50 or above were considered required or excellent, while those below 2.50 were not. For the MESAT, mean scores from pre-test and post-test were compared to determine the effect of the developed LMS on students' academic achievement in Microsoft Excel. Standard deviation values not exceeding 1.96 indicated closely clustered and valid responses.

Hypotheses were tested at the 0.05 significance level using t-test (H01), ANOVA (H02 and H03), and ANCOVA (H04). ANCOVA was used to control for initial group differences due to the use of intact classes. The null hypothesis was rejected if the significance value was less than 0.05, and retained if it was 0.05 or greater.

3. RESULTS

3.1 What are the learning activities required in developing the Learning Management System (LMS) on Microsoft Excel for students in Universities?

The first objective of this study is to find answers to the learning activities required in developing the Learning Management System (LMS) on Microsoft Excel for students.

Table 1: Mean responses of the learning activities required in developing the Learning Management System (LMS) on Microsoft Excel for computer education students in Universities.

S/No	Items	Mean	Std. Deviation	Remarks
1	Introduction to Microsoft Excel	3.50	.659	Required
2	Plotting charts using Excel	3.46	.588	Required
3	Use of conditional logic	3.58	.583	Required
4	Use of formulas	3.50	.722	Required
5	Use of functions	3.58	.583	Required
6	Use of Excel for data processing.	3.58	.583	Required
7	Use of cell references	3.42	.654	Required
8	Formatting Spreadsheet	3.50	.659	Required

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

Results in Table 1 showed the learning activities required in developing the Learning Management System (LMS) on Microsoft Excel for students in Universities in South East, Nigeria. All the items (1-8) had mean scores ranging from 3.42 to 3.58, indicating that the items are highly appropriate, and the architectural design is highly appropriate for the development of the LMS. The standard deviation score ranged from 0.583 to 0.722, indicating that the responses are not divergent.

3.2 What are the delivery systems required for developing the Learning Management System (LMS) on Microsoft Excel for computer education students in Universities?

The second objective of this study is to find answers to the delivery systems required in developing the Learning Management System (LMS) on Microsoft Excel for students in Universities.

Table 2: Mean responses on the delivery systems required for developing the Learning Management System (LMS) on Microsoft Excel for computer education students in Universities.

S/No	Items	Mean	Std. Deviation	Remarks
1	Make teaching contents available on the school website.	3.75	.531	Required
2	Use of podcast for teaching and learning.	3.42	.583	Required
3	Utilising blended learning for teaching and learning.	3.46	.721	Required
4	Use of social media platforms (LinkedIn, Facebook).	3.25	.737	Required
5	Learning through Email Courses.	3.50	.834	Required
6	Use of downloadable videos for teaching and learning.	3.17	.963	Required
7	Use of audio for the deaf.	3.13	.991	Required
8	Use of simulation.	3.46	.779	Required

Table 2 showed the result of the delivery systems required for developing the Learning Management System (LMS). The items had mean values ranging from (3.13-3.75) showing that they are all delivery systems required for the development of Learning Management System. The standard deviation values for the items ranged from 0.531 – 0.991 which were below 1.96 showing that the mean responses were not far apart or dispersed.

Research question 4: What is the acceptability level of the developed Learning Management System (LMS) on Microsoft Excel for students in Universities?

The fourth objective of this study is to find answers the expert acceptability level of the developed Learning Management System (LMS) on Microsoft Excel for students in Universities.

Table 3: Expert's response on the developed LMS

S/No	Items	Mean	Std. Deviation	Remarks
1	Compatibility with different browsers	3.70	.483	Excellent
2	Flexibility and Extensibility (ability to add new contents in the future).	3.70	.483	Excellent
3	Error handling of the LMS.	3.40	1.074	Excellent
4	Scalability even when multiple users use the software online at the same time.	3.50	.527	Excellent
5	Availability of teaching aids (audio, text and video illustration)	3.60	.516	Excellent
6	Conformity to the user interface design of the LMS.	3.30	.483	Excellent
7	Responsiveness on various browsers	3.60	.516	Excellent
8	Use Simulations	3.80	.422	Excellent

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

9	Readability of animated and dynamic texts	3.00	.667	Excellent
10	Ease in referring users to both online and offline books for more understanding.	2.90	.316	Excellent
11	Effectively covers the Microsoft Excel curriculum for Universities.	3.60	.516	Excellent
12	Sequential arrangement of topics	3.60	.516	Excellent
13	Effectively tracking students' engagement activity log	3.20	.918	Excellent
14	Adequately assessing students' performance	3.90	.316	Excellent
15	Activate user control/identification for all users	3.40	.699	Excellent
16	Availability of trial tests after each module.	2.80	.421	Excellent
17	Relevance of graphics to lesson.	3.30	.483	Excellent
18	Ease of uploading and downloading files	3.60	.699	Excellent
19	Simplicity in the use of language	3.40	.843	Excellent
20	Continuous availability online for the research work	3.30	.483	Excellent

Table 3 shows the result of the assessment of the developed LMS by software developers. The result of the assessment showed that compatibility with different browsers, flexibility and extensibility, error handling of the LMS, scalability even when multiple users use the software online at the same time, availability of teaching aids, conformity to the user interface design of the LMS, responsiveness on various browsers, use of Simulations and all other items, had mean ranging between (3.20-3.90) indicating that the items were rated as Excellent. This implies that the developed Learning Management System conforms to the design that guided the development of the LMS.

Research question 5: What is the effect of the developed Learning Management System (LMS) on Microsoft Excel for students in Universities.

The data collected for answering the research question 5 is as shown below on Table 4.

Table 4: Mean and Standard deviation of the Microsoft Excel Student Assessment Test Result (Pre-test and Post-Test) showing mean gain.

Measure of Central Tendency	N	$\bar{X}$	SD	Mean Gain
Pre-test	89	39.06	5.99	3.43
Post-test	89	42.49	3.69	

Table 4 shows the summary of the scores of students of University of Nigeria, Nsukka, Nnamdi Azikiwe University Awka and Michael Okpara University of Agriculture, Umudike for the pre-test (without the LMS) and the post-test using the Microsoft Excel LMS. The mean score for the pre-test without the LMS was 39.05 with a standard deviation of 5.99 while the mean score for post-test with LMS is 42.49 and standard deviation of 3.69. The mean gain which is the difference between the pre-test and post-test mean score was 3.43. However, for each of the test, the post-test mean was greater than the pre-test mean. This is an indication that the Microsoft Excel Learning Management System improved students' performance.

4. DISCUSSIONS

The results of this study were discussed based on the research questions guiding the study:

4.1 What are the learning activities to be implemented in developing the Learning Management System (LMS) on Microsoft Excel for students in Universities?

The data summarized in Table 1 provides comprehensive insights into research question 1, which explores the specific learning activities integrated into the Learning Management System (LMS) for teaching Microsoft Excel to computer education students in universities in

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

South East, Nigeria. The mean scores for each item indicate a strong consensus among respondents regarding the necessity of these activities, as all items received mean values above 3.40, with standard deviations reflecting a relatively high level of agreement.

These results demonstrate that the LMS is designed to actively engage students in practical and relevant tasks within Microsoft Excel. The emphasis on activities such as plotting charts, applying conditional logic, utilizing formulas and functions, processing data, referencing cells, and formatting spreadsheets highlights a curriculum that prioritizes hands-on, skill-based learning.

This approach aligns closely with the perspective of Rich (2016), who asserts that *active content* is fundamental to any effective learning experience and should be prioritized in the development of educational systems.

By ensuring that these core activities are incorporated, the LMS not only addresses foundational and advanced Excel skills but also supports the development of competencies that are crucial for computer education students. The consistently high mean scores across all items further underscore the consensus among stakeholders regarding the relevance and necessity of these learning activities in achieving the educational objectives of the program.

4.2 What are the delivery systems required for developing the Learning Management System (LMS) on Microsoft Excel for students in Universities?

The data in Table 2 directly addresses research question 2, focusing on the delivery systems of the Learning Management System (LMS) for computer education students. The findings indicate a strong consensus on the necessity of diverse and accessible delivery methods, as reflected in the mean scores, all of which are above 3.10, signifying that each item is regarded as "Required" for effective LMS implementation.

The study also found out the need for learning through email courses and this agrees with Park (2003) which stated that learners can view, organize and schedule their learning activities based on their preferences. Use of downloadable video, audio and use of simulation were also part of the findings in this study and this agrees with Fong and Wang (2007) which stated that LMS makes blended learning possible and combines multiple forms of learning like eLearning, mobile learning, simulation based learning and even the traditional classroom training program and acts as a central repository such as short quizzes and videos for mobile learning.

These results collectively underscore the importance of a multi-channel, accessible, and flexible LMS delivery system, ensuring that all students, regardless of their location or learning needs, can effectively engage with educational content. The findings also reinforce the value of integrating both traditional and innovative digital tools to enhance the teaching and learning experience.

4.3 Experts Level Satisfaction with the Developed LMS.

The findings presented in Table 5 provide a comprehensive evaluation of the Learning Management System (LMS) by experts external to the development team, directly addressing research question 5 regarding the system's testing and rating outside the developers' environment. The results indicate a high level of satisfaction with the LMS, as reflected in the consistently high mean scores across all evaluated criteria, each receiving a remark of "Excellent."

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

In summary, the expert ratings confirm that the LMS not only conforms to its intended design but also possesses the necessary features to achieve its educational objectives effectively. The system's strengths in compatibility, scalability, flexibility, and comprehensive curriculum coverage position it as an exemplary tool for teaching Microsoft Excel in university settings. While minor improvements could be made in the areas of resource referral and module testing, the overall evaluation attests to the LMS's excellence and readiness for widespread adoption.

4.4 User Level Satisfaction with the Developed LMS.

Findings from Table 4 shows that the students improved tremendously when the LMS was used compared to the tradition teaching and testing method. This agrees with Rich (2016) which stated that an LMS designed for learners is oriented towards improving their academic performance through the provision of a fully-featured, self-contained learning experience, with the right feedback and a whole learning workflow guiding learners on their different paths

5. CONCLUSION

The Microsoft Excel Learning Management System was meticulously developed in alignment with the specifications identified during the requirement analysis phase and was tailored to address the established curriculum for teaching Microsoft Excel.

Validation by lecturers and subject-matter experts confirmed that the LMS adheres to the outlined requirements and effectively meets instructional goals. Subsequent implementation and testing with students demonstrated a marked enhancement in learning experiences, as evidenced by increased enthusiasm, deeper understanding, and greater active participation in learning Microsoft Excel1.

Recommendations

In light of the study's findings, the following recommendations are proposed:

1. The Federal Ministry of Education should formally adopt the developed Learning Management System for the instruction of spreadsheet courses across tertiary institutions, ensuring a standardized and effective approach to teaching Microsoft Excel.
2. Lecturers in computing disciplines are encouraged to utilize the LMS for improved teaching and learning outcomes. Emphasis should be placed on practical sessions and hands-on activities, prioritizing experiential learning over theoretical instruction.
3. Curriculum development bodies should integrate the LMS into the curriculum. This will foster a technology-driven educational framework that aligns with contemporary global standards.
4. Software companies are advised to employ the LMS as a tool for training and retraining their workforce in Microsoft Excel, recognizing its significance as a core application in modern office environments.
5. Universities should leverage the LMS to provide comprehensive Microsoft Excel training to all staff members and consider expanding its use to other applications relevant to daily institutional operations.

Volume 64 | Issue 09 | September 2025
DOI: 10.5281/zenodo.17213542

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Volume 64 | Issue 09 | September 2025
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