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Effectiveness of learning management system, teachers' techno-pedagogical skills, and students' learning engagement in Senior High School at the University Of Perpetual Help System-Jonelta Campuses

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Abstract. Information Communication Technology (ICT) changed the world orientation in general and education particularly in the teaching and learning process. A learning management system, or LMS, a software application that allows students to access course resources such as a syllabus, gradebook, discussion boards, and due dates (Center for Innovation in Teaching & Learning, 2021) has been widely utilized in the educational system. Several educational institutions have been using certain LMS in planning, implementing, and evaluating learning processes (Brush, 2020), hence, researches were conducted to determine its effect to the teaching-learning process. However, there were many studies conducted about the effectivity of LMS, teachers' techno-pedagogical skills, and students' engagement which were mostly in international settings, but no study yet had been conducted particularly in the province of Laguna and among the senior high school students of UPHS-JONELTA Campuses. Thus, the researcher was inspired to measure the effectiveness of LMS, the teachers' techno-pedagogical skills and students' learning engagement and the relationship among variables. This is to further come up with programs that would help improve the utilization of LMS and the pedagogical competence of the teachers to ensure the maximum learning engagement of the learners. This study utilized the descriptive-correlational research design which provides the most effective tool for determining the condition of relationship that exist (Bermudo et al., 2018). The respondents of the study consisted of 350 out of 3972 grade 12 students of University of Perpetual Help System JONELTA enrolled during the Academic Year 2022-2023. The sample size was computed using the Raosoft Size Calculator with the confidence level of 95 percent and a margin of error of 5 percent. The respondents were selected by utilizing stratified random sampling strategy. Proportional allocation was employed to calculate the number of the respondents selected from each campus. A total of 44 respondents came from Pangasinan Campus, 16 respondents from Pueblo de Panay Campus, 27 respondents from Isabela Campus, 54 respondents from GMA campus, 42 respondents from Manila campus and 167 respondents from Binan Campus for a total of 350 respondents in all. The research utilized modified standardized tests for the purpose of collecting the needed primary data. The first part covered the level of effectiveness of LMS in terms of system content, instruction, interaction, and technology quality. The second part covered the level of teachers' pedagogical skills in terms of using technology in teaching; using technology in providing learning experiences; and using technology in preparation. Lastly, the third part of the questionnaire covered the level of students' learning engagement in LMS. . Furthermore, a pilot test was also conducted and for the reliability of questionnaire using Cronbach Alpha, the results are as follow: for effectiveness of LMS: 0.963; for pedagogical skills: 0.934; and for students' engagement: 0.950. After some modifications made, it was shown

to the adviser for final approval. Based on the findings of the study, the study conclusions were drawn: The level of effectiveness of LMS in terms of system content, instruction, interaction, and technology quality is high. The level of the senior high school teachers' techno-pedagogical skills alongside with using technology in teaching; using technology in providing learning experiences; and using technology in preparation is very high. The level of the senior high school students' engagement in LMS is very high. Moreover, it was found out that the higher the level of effectiveness of LMS, the higher the teachers' level of techno-pedagogical skills. Also, the higher the level of effectiveness of LMS, the higher the level of students' engagement in LMS. Furthermore, the higher the level of teachers' pedagogical skills, the higher the level of engagement of the students in LMS. Therefore, the better the skills of the teachers in utilizing technology in teaching, the more the students are engaged in LMS. Lastly, the independent variables; instruction and interaction under the effectiveness of LMS and the overall techno-pedagogical skills of the teachers are the drivers of the level of students' engagement in LMS in the senior high school.

Keywords. Learning Management System, techno pedagogical skills, student learning engagement

Introduction

Information Communication Technology (ICT) changed the world orientation in general and education particularly in the teaching and learning process. A learning management system, or LMS, a software application that allows students to access course resources such as a syllabus, gradebook, discussion boards, and due dates (Center for Innovation in Teaching & Learning, 2021) has been widely utilized in the educational system. Several educational institutions have been using certain LMS in planning, implementing, and evaluating learning processes (Brush, 2020), hence, researches were conducted to determine its effect to the teaching-learning process. According to Athmika (2020) modern LMSs were based on inventions and innovations years ago but the new-age, millennial learner forced changes not just in the LMS but also in corporate training in general. Nguyen (2021) posits that in the digital age, learning management systems (LMS) are regarded as critical tools for knowledge acquisition and learning management. Hence, the demand of this modern time requires teachers to be adept with ICT in education including LMS thus becoming techno-pedagogically competent is necessary. However, there were many studies conducted about the effectivity of LMS, teachers' techno-pedagogical skills, and students' engagement which were mostly in international settings, but no study yet had been conducted particularly in the province of Laguna and among the senior high school students of UPHS-JONELTA Campuses

According to Perumal and Saravanakumar (2020) techno-pedagogical competency is now extremely important for teachers in the teaching and learning process, as it facilitates effective teaching and learning. All over the world, information at all levels is making tremendous progress. Information and innovation are currently being used in the field of education to create effective and interesting instruction and preparation for both students and teachers (Lyonga et al, 2021). Techno-pedagogical skills expounds on the skills needed to use technology for pedagogical purposes and the competence to integrate technology into teaching. Baregama (2021) emphasized that the teaching in class should not be boring, dull, or tiresome, but rather broad and open, interesting, creative and should provide a new meaningful environment which is not only possible if the faculty uses various technology techniques or types of media to enhance the academic excellence of the student, which necessitates the integration of technological pedagogical skills and content knowledge. However, her study

revealed that many faculty members still continue to teach using the old, boring, and uninteresting lecture method. Rao and Jalajakshi (2021) explain that teachers need to understand the importance of integration of technology with pedagogy as the present education revolves around technology enhanced learning.

Researches have proven the usefulness of LMS in the delivery of accessible and more systematic management of lessons, activities, examinations, and other student data. Ismail et al (2021) point out that most of the engagement in LMS is driven by educators. Therefore, the techno-pedagogical skills of teachers are important for the success and total learning engagement of the students. As Kumari and Rani (2022) explained -technical teaching skills are essential for making the teaching process enjoyable because they significantly alter the teacher's mode of interaction. On the other hand, the techno-pedagogical skills of teachers of secondary school teachers and the effectiveness of the LMS in enhancing the students' learning engagement has not been widely explored specifically among senior high school students where technology assisted learning has been one of the avenues in delivering quality education.

Several students were conducted describing the relationship among effectiveness of learning management system, teachers' techno-pedagogical skills, and students' learning engagement. Yousaf et al (2021) show in their study the use of LMS in higher educational institution improves the teaching-learning process. Also, as emphasized by Bradley (2021) the LMS provides an opportunity for the teachers to facilitate and model discussions, plan online activities, set learning expectations, provide learners with option, am assist in problem-solving with processes for decision-making. D'Angelo (2018) states that by incorporating technology into the curriculum, instructors gain an invaluable opportunity to improve student engagement and academic success. In addition, Teng and Wang (2021) found that emotional engagement has the strongest positive effect on educational technology engagement. The findings of the study of Bergdahi et al (2018) T show that high levels of engagement correlate with learning activities in which the teacher requested and observed the participation of all students, and technologies were orchestrated to gain insight into students' knowledge and learning processes.

However, there were many studies conducted about the effectivity of LMS, teachers' techno-pedagogical skills, and students' engagement which were mostly in international settings, but no study yet had been conducted particularly in the province of Laguna and among the senior high school students of UPHS-JONELTA Campuses .

Thus, the researcher was inspired to measure the effectiveness of LMS, the teachers' techno-pedagogical skills and students' learning engagement and the relationship among variables. This is to further come up with programs that would help improve the utilization of LMS and the pedagogical competence of the teachers to ensure the maximum learning engagement of the learners.

1.1 Objective of the Study

The overall objective of this study was to determine the effectiveness of the LMS as perceived by the respondents and its relationship to the teachers' techno-pedagogical skills and students' learning engagement. Specifically, it had the following aims: (1) determine the level of effectiveness of LMS in terms of system content; instruction; interaction; and technology quality, (2) investigate the level of the teachers' pedagogical skills in terms of using technology in teaching, using technology in providing learning experiences; and using technology in preparation (3) determine the level of students' engagement in LMS, (4) discover if there is a significant relationship between the level of effectiveness of LMS and the level of teachers' pedagogical skills, (5) determine if there a significant relationship between

the level of effectiveness of LMS and the level of students' engagement in LMS (6) find out if there a significant relationship between the teachers' level of pedagogical skills and the student's level of engagement in LMS (7) finally to determine how predictive is the level of effectiveness of the LMS and teachers' pedagogical skills taken singly or in combination, of the level of students' engagement in LMS.

II. Methods

This study aimed to determine the effectiveness of the LMS, teachers' techno-pedagogical skills and students' learning engagement in LMS. This study utilized the descriptive-correlational research design which provides the most effective tool for determining the condition of relationship that exist (Bermudo et al., 2018). This study employed the said method using survey technique. According to McDonald and Headlam (2016), this is used to gather large-scale data such as current conditions in order to make generalizations. It describes and explains phenomenon and is suited to most correlation studies.

The researcher used empirical data and documentary data for the conduct of the study. Empirical data were acquired from the respondents of the study who were the selected senior high school students from the five JONELTA Campuses of the University of Perpetual Help System Laguna.

The respondents of the study consisted of 350 out of 3972 grade 12 students of University of Perpetual Help System JONELTA enrolled during the Academic Year 2022-2023. The sample size was computed using the Raosoft Size Calculator with the confidence level of 95 percent and a margin of error of 5 percent. The respondents were selected by utilizing stratified random sampling strategy. Proportional allocation was employed to calculate the number of the respondents selected from each campus. A total of 44 respondents came from Pangasinan Campus, 16 respondents from Pueblo de Panay Campus, 27 respondents from Isabela Campus, 54 respondents from GMA campus, 42 respondents from Manila campus and 167 respondents from Binan Campus for a total of 350 respondents in all.

The research utilized modified standardized tests for the purpose of collecting the needed primary data. The first part covered the level of effectiveness of LMS in terms of system content, instruction, interaction, and technology quality. The second part covered the level of teachers' pedagogical skills in terms of using technology in teaching; using technology in providing learning experiences; and using technology in preparation. Lastly, the third part of the questionnaire covered the level of students' learning engagement in LMS.

Since the questionnaire was self-made, it was subjected to the face and content validity. It was shown to the panel of experts in teaching specifically in ICT integration, in statistics, and in research for their comments and suggestions. Then the questionnaires were distributed to the target respondents through Google Form for easy and safe dissemination and retrieval. Furthermore, a pilot test was also conducted and for the reliability of questionnaire using Cronbach Alpha, the results are as follow: for effectiveness of LMS: 0.963; for pedagogical skills: 0.934; and for students' engagement: 0.950. After some modifications made, it was shown to the adviser for final approval.

The following statistical tools were used in this study: weighted mean and ranking were used to determine the (a) level of effectiveness of LMS; (b) level of teachers' pedagogical skills, and (c) the level of students' learning engagement. Pearson r correlation was used to determine if there is significant relationship among variables. And. Stepwise Multiple Regression Analysis was used to test the validity of the assessment of each independent variable's statistical significance sequentially in a linear regression Model. Stepwise regression

seeks to identify a group of independent variables that have a substantial impact on the dependent variable using a series of tests (such as F-test and t-test).

III. Results and Discussion

Table 1

The Level of effectiveness of the LMS: System Content

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. I am satisfied with the announcement system when there is new uploading.	3.15	High (Agree)	5
2. Announcement system helps me get an approach to new uploading quickly.	3.21	High (Agree)	3.5
3. The system enables students to evaluate teachers and school services.	3.23	High (Agree)	2
4. The contents are updated and appropriate to the learners' needs.	3.24	High (Agree)	1
5. The system content includes guidelines for extra - curricular activities.	3.21	High (Agree)	3.5
Average	3.21	High (Agree)	

Table shows the level of effectiveness of LMS in terms of system content. As seen in table 1, indicator no. 4 “The contents are updated and appropriate to the learners’ needs” got the highest weighted mean of 3.24, verbally interpreted as High and ranked 1. Second in rank is indicator no. 3 “The system enables students to evaluate teachers and school services” with the weighted mean of 3.23 verbally interpreted as High. Indicator no. 2 “Announcement system helps me get an approach to new uploading quickly” and no. 5 “The system content includes guidelines for extra -curricular activities were” both 3.5 in rank with the weighted mean of 3.21 verbally interpreted High. Last in rank is indicator no 1 . “I am satisfied with the announcement system when there is new uploading “ with the weighted mean of 3.15 verbally interpreted as High.

In conclusion, the general weighted average of 3.21 revealed that the respondents assessed the level of effectiveness of the LMS along system content as high. This means that the respondents agreed and found the usability of the LMS software highly effective in their classes, and that they could use all the features of the LMS including important announcements and teachers’ evaluations.

Table 2

The Level of Effectiveness of the LMS: Instruction

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. I feel that using software is too easy.	3.15	High (Agree)	2.5
2. It takes me not too much time to get familiar with the software.	3.03	High (Agree)	7
3. Instruction information is clear and detailed.	3.16	High (Agree)	1

4. I can get quick support when there is any problem related to software.	3.04	High (Agree)	6
5. I can easily use this software at first time.	3.05	High (Agree)	5
6. All functions are running smoothly.	2.99	High (Agree)	8
7. Instruction guidelines are very clear for new users.	3.09	High (Agree)	4
8. All guidelines are designed in easy-to-understand structure Interaction.	3.15	High (Agree)	2.5
Average	3.08	High (Agree)	

Table 2 shows the level of effectiveness of LMS in terms of instructions. The results show that indicator no. 3 “Instruction information is clear and detailed” ranked 1 with the weighted mean of 3.16 verbally interpreted as High. Indicator no. 1 “I feel that using software is too easy” and indicator no. 8. “All guidelines are designed in easy-to-understand structure Interaction” ranked 2.5 with the weighted mean of 3.15 verbally interpreted as High. Fourth in rank is indicator no. 7. “Instruction guidelines are very clear for new users” with the weighted mean of 3.09 verbally interpreted as High. Indicator no. 5 “I can easily use this software at first time” ranked 5 with the weighted mean of 3.05 verbally interpreted as High. Ranked 6 is indicator no. 4. “I can get quick support when there is any problem related to software” with the weighted mean of 3.04 verbally interpreted as High. Indicator no. 2. “It takes me not too much time to get familiar with the software” and fell on rank 7 with the weighted mean of 3.03 verbally interpreted as High. Ranked 8 is indicator no. 6. “All functions are running smoothly” with the weighted mean of 2.99 verbally interpreted as High.

To sum up, the level of effectiveness of the LMS in terms of instruction got an average weighted mean of 3.08 and interpreted as High. This means that the respondents agreed and experienced a clear and detailed instruction in the LMS.

Table 3
The Level of Effectiveness of the LMS: Interaction

Indicators	Weighted Mean	Verbal Interpretation	Rank
1.Learner- elearner interaction is too convenient.	3.11	High (Agree)	4.5
2.Online course discussion happens smoothly.	2.95	High (Agree)	12
3.I can learn more from my classmate by using this software.	3.01	High (Agree)	11
4.There is an easy -to- follow online group discussion.	3.04	High (Agree)	10
5.Learner-lecturer interaction happens easily	3.07	High (Agree)	8.5
6.There is easy -to- directly raise question with lecturers via this software.	3.08	High (Agree)	7
7.Group discussion with lecturers happens effectively by using this software.	3.09	High (Agree)	6
8.There is easy- to- get sharing from lectures.	3.17	High (Agree)	2

9.It is convenient to get material sharing from my friend via this software.	3.15	High (Agree)	3
10.I can find information uploaded in previous time very easily.	3.18	High (Agree)	1
11.I find no difficulty in performing online assignment via this software.	3.07	High (Agree)	8.5
12.I can filter data to find material needed on this software	3.11	High (Agree)	4.5
Average	3.08	High (Agree)	

Table 3 shows the level of effectiveness of LMS in terms of Interaction. The results show that indicator no. 10. "I can find information uploaded in previous time very easily" ranked 1 with the weighted mean of 3.18, verbally interpret as high. Second in rank is indicator no. 8. "There is easy- to- get sharing from lectures" with the weighted mean of 3.17 verbally interpreted as High. Indicator no. 9. "It is convenient to get material sharing from my friend via this software" ranked 3rd with the weighted mean of 3.15 verbally interpreted as high. Ranked 4.5 are indicator no. 1. "Learner- elearner interaction is too convenient" and indicator no. 12. "I can filter data to find material needed on this software" with the weighted mean of 3.11 verbally interpreted as High. Ranked 6 is indicator no. 7. "Group discussion with lecturers happens effectively by using this software" with the weighted mean of 3.09 verbally interpreted as high. Ranked 7 is indicator no. 6. "There is easy -to- directly raise question with lecturers via this software" with the weighted mean of 3.08 verbally interpreted as High. Ranked 8.5 are indicator no. 5. "Learner-lecturer interaction happens easily" and indicator no. 11. "I find no difficulty in performing online assignment via this software" with the weighted mean of 3.07 verbally interpreted as High. Ranked 10 is indicator no. 4. "There is an easy -to- follow online group discussion with the weighted " mean of 3.04 verbally interpreted as High.

In conclusion, the average mean of 3.08 revealed that the level effectiveness of the LMS in terms of interaction was high. The results imply that the respondents could interact with their classmates, schoolmates, and teachers through the LMS.

Table 4
The Level of effectiveness of the LMS: Technology Quality

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. All pieces information are easy to understand and easy to use.	3.19	High (Agree)	3
2.The technology design allows me to have flexible time connection.	3.16	High (Agree)	4.5
3.The technology design allows me to have flexible accessibilities	3.21	High (Agree)	1.5
4.All functions on this software are designed in appealing way.	3.15	High (Agree)	6
5.Theme of software is designed in easy-to-search for information uploaded long time ago.	3.16	High (Agree)	4.5
6.Software is designed in user-friendly structure.	3.21	High (Agree)	1.5
Average	3.18	High (Agree)	

Table 4 shows the level of effectiveness of LMS in terms of technology quality. The results show that indicator no. 3 “The technology design allows me to have flexible accessibilities” and indicator no. 6.”Software is designed in user-friendly structure” with the weighted mean of 3.21 verbally interpreted as High. Indicator no. 1. “All pieces information are easy to understand and easy to use” is third in rank with the weighted mean of 3.19 verbally interpreted as High. Indicator no. 2.”The technology design allows me to have flexible time connection” and no. 5.”Theme of software is designed in easy-to-search for information uploaded long time ago” ranked 4.5 with the weighted mean of 3.16 verbally interpreted as High. Indicator no. 4.”All functions on this software are designed in appealing way”ranked 6 with the weighted mean of 3.15 verbally interpreted as High.

To sum up, the average weighted mean of 3.18 revealed that the level of effectiveness of the LMS in terms of technology quality was High. This implies that respondents could effectively use the LMS with its user-friendly features thus it is easy to use.

Table 5

Composite Table for the Level of the effectiveness of LMS

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. System content	3.21	High (Agree)	1
2. Instruction	3.08	High (Agree)	3.5
3. Interaction	3.08	High (Agree)	3.5
4. Technology quality	3.18	High (Agree)	2
Overall Weighted Mean	3.14	High (Agree)	

Table 5 shows the composite table of the level of effectiveness of LMS. As shown in the table, indicator no. 1 “System Content ranked 1 with a weighted mean of 3.21 verbally interpreted as High; second in rank is indicator no. 4 Teacher Technology with a weighted mean of 3.18 verbally interpreted as High. Last in rank are indicators 2 Instruction and Indicator no. 3 Interaction with the weighted mean of 3.08 verbally interpreted as High.

To sum up, an average weighted mean of 3.14 reveals that the LMS is highly effective. This signifies that the LMS system content and the features of the LMS were being used effectively by the respondents, with its productive technology quality, and smooth interface which is also used for interaction and communication.

Table 6

The Level of the Teachers’ Techno Pedagogical Skills: Using Technology in Teaching

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. My teachers prepare my lecture with the help of Microsoft word and power point presentation.	4.47	Very High (Strongly Agree)	3
2. Teaching and learning materials have been stored in the teachers' Google drive	4.24	Very High (Strongly Agree)	5

3. My teachers use macro media flash software for creating animations in my subject during presentation.	4.01	High (Agree)	9
4. PowerPoint templates have been used during teaching.	4.45	Very High (Strongly Agree)	4
5. Rare sounds and famous speeches have been used during lecture with the help of a web source.	4.09	High (Agree)	7
6. Scanners are used to scan important printed documents and manuscripts useful for teaching..	4.08	High (Agree)	8
7. My teachers use video clippings in teaching to catch the attention of the students due to the lack of time..	4.23	Very High (Strongly Agree)	6
8. My teachers encourage the participation of the students in my lecture with the help of interactive online activities.	4.50	Very High (Always)	2
9. Digital Library has been used by my teachers in teaching.	4.00	High (Agree)	10
10. A computer/laptop and TV sets are essential in my teachers' teaching.	4.62	Very High (Strongly Agree)	1
Average	4.27	Very High (Strongly Agree)	

Table 6 presents the level of teachers' pedagogical skills: using technology in teaching. As shown in the results, indicator no. 10. "A computer/laptop and TV sets are essential in my teachers' teaching" ranked 1 with the weighted mean of 4.62 verbally interpreted as Very High. Second in rank is indicator no. 8. "My teachers encourage the participation of the students in my lecture with the help of interactive online activities" with the weighted mean of 4.50 verbally interpreted as Very High. Ranked 3rd is indicator no. 1. "My teachers prepare my lecture with the help of Microsoft word and power point presentation" with the weighted mean of 4.47 verbally interpreted as Very High. Indicator no. 4. "PowerPoint templates have been used during teaching" ranked 4 with the weighted mean of 4.45 verbally interpreted as Very High. Fifth in rank is indicator no. 2. "Teaching and learning materials have been stored in the teachers' Google drive" with the weighted mean of 4.24 verbally interpreted as Very High. Ranked 6 is indicator no. 7. "My teachers use video clippings in teaching to catch the attention of the students due to the lack of time" with the weighted mean of 4.23 verbally interpreted as Very High. Ranked 7 is indicator no 5. "Rare sounds and famous speeches have been used during lecture with the help of a web source" with the weighted mean of 4.09, verbally interpreted as High. Ranked 8 is indicator no 6. "Scanners are used to scan important printed documents and manuscripts useful for teaching" with the weighted mean of 4.08, verbally interpreted as High. Ranked 9 is indicator no. 3. "My teachers use macro media flash software for creating animations in my subject during presentations" with the weighted mean of 4.01 verbally interpreted as High. Ranked 10 is indicator no. 9. "Digital Library has been used by my teachers in teaching" with the weighted mean of 4.0, verbally interpreted as High.

To sum up, a average mean of 4.27 revealed that the level of the teacher's pedagogical skills in terms of Using Technology in Teaching was Very High. The results mean that the teachers' ability to integrate technology in the delivery of the lessons was always evident.

The findings support the study of Greganda and Yango (2022) among faculty members in a local university revealed that the respondents are techno-pedagogically proficient in the sense that they can draft and develop learning and assessment activities that align with learning

goals and objectives, that they can motivate students and demonstrate enthusiasm and interest while teaching virtually, and that they can use technology effectively in teaching.

Table 7
The Level of the Teachers’ Techno Pedagogical Skills: Using Technology in Providing Learning Experiences

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. My teachers develop interest among the students by providing latest information and important circulars with the help of digital display boards.	4.45	Very High (Strongly Agree)	2
2. My teachers provide individual attention to the students with the help of technology.	4.42	Very High (Strongly Agree)	3
3. “Word art” option in MS-word software is used by the teacher to grab the attention of the students towards the subject.	4.06	High(Agree)	5
4. My teachers give important instructions and assignments to the students with the help of websites.	4.49	Very High (Strongly Agree)	1
5. My teachers provide contrived learning experience to the students through multimedia images.	4.41	Very High (Strongly Agree)	4
Average	4.37	Very High (Strongly Agree)	

Table 7 shows the level of teachers’ pedagogical skills: using technology in providing learning experiences. The results reveal that indicator no. 4. “My teachers give important instructions and assignments to the students with the help of websites” ranked 1 and got the weighted mean of 4.41 verbally interpreted as Very High. Ranked 2 is indicator no 1. “My teachers develop interest among the students by providing latest information and important circulars with the help of digital display boards” with the weighted mean of 4.45 verbally interpret Very High. Ranked 3 is indicator no. 2. “My teachers provide individual attention to the students with the help of technology” with the weighted mean of 4.42 verbally interpreted as Very High. Fourth is rank is indicator no. 5. “My teachers provide contrived learning experience to the students through multimedia images” with the weighted mean of 4.41 verbally interpreted as Very High. Fifth in rank is indicator no. 3. “Word art” option in MS-word software is used by the teacher to grab the attention of the students towards the subject” with the weighted mean of 4.06 verbally interpreted as High.

To sum up, an average mean of 4.37 revealed that the level of teachers’ pedagogical skills in using technology in providing learning experiences was Very High. The results imply that the teachers effectively used technology in providing meaningful experiences among the learners for they gave important instructions and assignments to the students with the help of websites.

Table 8
The Level of the Teachers' Techno Pedagogical Skills: Using Technology in Preparation

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. My teachers have the necessary skill to use technological resources effectively for preparing lessons.	4.55	Very High (Strongly Agree)	1
2. As a part of preparation, my teachers make use of video lesson also.	4.29	Very High (Strongly Agree)	4
3. My teachers visit digital libraries for preparing lessons.	4.09	High	5
4. My teachers download relevant materials related to the topic to be taught and use them in class.	4.43	Very High (Strongly Agree)	2
5. My teachers update themselves with the latest lecturers by eminent scholars and by attending subject oriented conferences.	4.38	Very High (Strongly Agree)	3
Average	4.35	Very High (Strongly Agree)	

Table 8 shows the level of teachers' pedagogical skills using technology in preparation. The data show that indicator no. 1. "My teachers have the necessary skill to use technological resources effectively for preparing lessons" ranked 1 with the weighted mean of 4.55 verbally interpreted as Very High. Ranked 2 is indicator no. 4. "My teachers download relevant materials related to the topic to be taught and use them in class" with the weighted mean of 2.43 verbally interpreted as Very High. Ranked 3 is indicator no. 5. "My teachers update themselves with the latest lecturers by eminent scholars and by attending subject-oriented conferences" with the weighted mean of 4.38 verbally interpreted as Very High. Ranked 4 is indicator no. 2. "As a part of preparation, my teachers make use of video lesson" also with the weighted mean of 4.29 verbally interpreted as Very High. Ranked 5 is indicator no. 3. "My teachers visit digital libraries for preparing lessons" with the weighted mean of 4.09 verbally interpreted as High.

In summary, an average mean of 4.35 revealed that the teachers' level of pedagogical skills in terms of using technology in preparation was Very High. The results imply that the teachers were effectively utilizing technology in the preparation of the lessons. Likewise, they had the necessary skills to use technological resources effectively for preparing lessons.

Table 9
Composite Table for the Level of the Teachers' Techno Pedagogical Skills

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Using technology in teaching	4.27	Very High (Strongly Agree)	3
2. Using technology in providing learning experiences	4.37	Very High (Strongly Agree)	1
3. Using technology in preparation	4.35	Very High (Strongly Agree)	2
Overall Weighted Mean	4.33	Very High (Strongly Agree)	

Table 9 shows the composite result of the teachers' pedagogical skills. The results show that indicator no. 2 "Using technology in providing learning experiences" ranked 1 with the weighted mean of 4.37 verbally interpreted as Very High. Ranked 2 is indicator no. 3 "Using technology in preparation" with the weighted mean of 4.35 verbally interpreted as Very High. Last in rank is indicator no. 1. "Using technology in teaching" with the weighted mean of 4.27 verbally interpreted as Very High.

In summary, the overall weighted mean of 4.33 revealed that the teachers' level of techno-pedagogical skills was very high. The results signify that the teachers were effectively integrating and utilizing technology in their teaching strategies from preparation of the lesson, to providing learning experiences, and during the teaching proper.

Table 10
The Level of Students' Engagement in LMS

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Online learning systems are major part of my university education	3.52	Very High (Strongly Agree)	1
2. I use online system to improve how I learn at university.	3.45	Very High (Often)	4
3. Online systems help me interact better in the university.	3.35	Very High (Strongly Agree)	14
4. I use online system to manage my university study.	3.45	Very High (Strongly Agree)	4
5. I use online materials to improve my learning.	3.51	Very High (Strongly Agree)	2
6. I use online materials to make lectures more meaningful.	3.45	Very High (Strongly Agree)	4
7. I identify expected work standards using online systems..	3.40	Very High (Strongly Agree)	10.5
8. I find that online materials challenge me to learn.	3.28	Very High (Strongly Agree)	15.5
9. I find online materials interesting.	3.43	Very High (Strongly Agree)	7.5
10. Using online materials made my study seem more relevant.	3.40	Very High (Strongly Agree)	10.5
11. Using online learning systems made me feel part of the university.	3.40	Very High (Strongly Agree)	10.5
12. Using online learning materials help me put my study in real-world contexts.	3.40	Very High (Strongly Agree)	10.5
13. I use online learning system with other students..	3.44	Very High	6

14. I use online learning system to work with other students outside of class.	3.25	(Strongly Agree) Very High	17
15. I use online learning system to do academic work with other students.	3.43	(Strongly Agree) Very High	7.5
16. I use university online system to communicate with other students.	3.21	(Agree) High	18
17. Teaching staffs participate in online discussion.	3.38	(Strongly Agree) Very High	13
18. I find it easy to explain my ideas in online discussion.	3.20	(Agree) High	19
19. I had helpful online discussion with other students.	3.28	(Strongly Agree) Very High	15.5
20. I meet new people when using the online learning system.	3.17	(Agree) High	20
Average	3.37	Very High (Strongly Agree)	

Table 10 shows the level of students' level of engagement in LMS. The data reveal that indicator no. 1. "Online learning systems are major part of my university education" ranked 1 with the weighted mean of 3.52 verbally interpreted as Very High. Rank 2 is indicator no. 5. "I use online materials to improve my learning" with a weighted mean of 3.51 verbally interpreted as Very High. Indicator no. 2. "I use online system to improve how I learn at university" indicator no. 4. "I use online system to manage my university study", and indicator no. 6. "I use online materials to make lectures more meaningful" ranked 4.5 and got a weighted mean of 3.45 verbally interpreted as Very High. Indicator no.

Meanwhile, both indicators no. 9. "I find online materials interesting and no. 15. I use online learning system to do academic work with other students" ranked 7.5 and got the weighted mean got the weighted mean of 3.43 verbally interpreted as Very High. Indicator no. 7. "I identify expected work standards using online systems" indicator no. 10. "Using online materials made my study seem more relevant" indicator no. 11. "Using online learning systems made me feel part of the university", and indicator no. 12. "Using online learning materials help me put my study in real-world contexts" got the weighted mean of 3.40 verbally interpreted as Very High. Indicator no. 17. "Teaching staffs participate in online discussion" ranked 13 and got the weighted mean of 3.48 verbally interpreted as Very High. Indicator no. 3. "Online systems help me interact better in the university" got the weighted mean of 3.45 and verbally interpreted as Very High ranked 14. Indicator no. 8. "I find that online materials challenge me to learn" and indicator no. 19. "I had helpful online discussion with other students" ranked 15.5 got a weighted mean of 3.28 verbally interpreted as Very High. Indicator no. 14. "I use online learning system to work with other students outside of class" ranked 17 and got a weighted mean of 3.25 verbally interpreted as Very High. Indicator no. 16. "I use university online system to communicate with other students" got a weighted mean of 3.21 verbally interpreted as High and ranked 18. Indicator no. 18 "I find it easy to explain my ideas in online discussion" ranked 19 and got a weighted mean of 3.20 verbally interpreted as High. Indicator

no. 20. “I meet new people when using the online learning system” and got a weighted mean of 3.17, verbally interpreted as Very High and ranked 20.

To sum up, an average weighted mean of 3.37 revealed that the level of student engagement was very high. The results imply that technology was a part of the learning of the respondents as it was often used in every learning activity and the daily academic task of the respondents where they were highly and fully engaged.

Table 11

Relationship between the Level of Effectiveness of LMS and the Teachers’ Level of Pedagogical Skills

Effectiveness of LMS	Teachers’ Pedagogical Skills		
	Using technology in teaching	Using technology in providing learning experiences	Using technology in preparation
System content	r=0.508** Moderate correlation p=0.000	r=0.517** Moderate correlation p=0.000	r=0.510** Moderate correlation p=0.000
Instruction	r=0.501** Moderate correlation p=0.000	r=0.464** Moderate correlation p=0.000	r=0.453** Moderate correlation p=0.000
Interaction	r=0.516** Moderate correlation p=0.000	r=0.483** Moderate correlation p=0.000	r=0.455** Moderate correlation p=0.000
Technology quality	r=0.458** Moderate correlation p=0.000	r=0.491** Moderate correlation p=0.000	r=0.449** Moderate correlation p=0.000

****Significant @ 0.01**

As shown in Table 11, the relationship between the level of effectiveness of LMS and the teachers’ level of pedagogical skills. The results revealed that System Content had a moderate correlation with the teacher’s level of pedagogical in terms of using technology, using technology in providing learning experiences, and Using technology in preparation with a value of $r=0.508$, $r=0.517$, and $r=0.510$ respectively, while Instruction had a moderate correlation with the teacher’s level of pedagogical in terms of using technology, using technology in providing learning experiences and Using technology in preparation with a value of $r=0.508$, $r=0.517$, and $r=0.453$ respectively. Meanwhile, Interaction had a moderate correlation with the teacher’s level of pedagogical in terms of using technology, using technology in providing learning experiences, and Using technology in preparation with a value of $r=0.516$, $r=0.483$, and $r=0.455$; lastly Technology quality had a moderate correlation with the teacher’s level of pedagogical in terms of using technology, using technology in providing learning experiences and Using technology in preparation with a value of $r=0.458$, $r=0.491$, and $r=0.449$ respectively. Therefore, there was a significant relationship between the level of effectiveness of LMS and teachers’ level of techno-pedagogical skills.

This means that the higher the level of effectiveness the LMS in terms of system content, instruction, interaction, and technology quality, the higher the teachers’ level of techno-pedagogical skills along using technology in teaching, using technology in providing learning experiences and using technology in preparation

Table 12
Relationship between the Level of Effectiveness of LMS and the Students' Level of Engagement in LMS

Effectiveness of LMS	Pearson r value	p-value	Interpretation
System content	0.457** Moderate correlation	0.000	Significant
Instruction	0.442** Moderate correlation	0.000	Significant
Interaction	0.521** Moderate correlation	0.000	Significant
Technology Quality	0.489** Moderate correlation	0.000	Significant

****Significant @ 0.01**

As shown in Table 12 is relationship between the level of effectiveness of LMS and the students level of engagement in LMS. The results revealed that system content, instruction, interaction, and technology quality had a moderate correlation with the students' level of engagement with LMS with the value of $p=0.457$, $p=0.442$, $p=0.521$, and 0.489 respectively. Therefore, there was a significant relationship between the level of effectiveness of LMS and the level of students' engagement in LMS.

This implies that the higher the level of effective the LMS in terms of system content, instruction, interaction, and technology quality means, the higher the level of student engagement.

Table 13
Relationship between the Teachers' Level of Pedagogical Skills and the Students' Level of Engagement in LMS

Teachers' Pedagogical Skills	Pearson r value	p-value	Interpretation
Using technology in teaching	0.499** Moderate correlation	0.000	Significant
Using technology in providing learning experiences	0.545** Moderate correlation	0.000	Significant
Using technology in preparation	0.588** Moderate correlation	0.000	Significant

****Significant @ 0.01**

As shown in Table 13 the relationship between the teachers' level of pedagogical skills in terms of using technology in teaching, using technology in providing learning experiences, and using technology in preparation is moderately correlated to the student's level of engagement in LMS with all the p-value result of 0.000. Therefore, there was a significant relationship between the level of teachers' techno-pedagogical skills and the level of students' engagement in LMS.

This means that the higher the level of the teachers' techno-pedagogical skills in terms of using technology in teaching, in providing learning experiences, and in preparation of lessons, the higher the level of students' engagement in LMS.

Table 14

Stepwise Regression between the Level of Effectiveness of the LMS and Teachers' Pedagogical Skills taken singly or in a combination of the Level of Students' Engagement in LMS

	Predictor	Dependent Variable	R²	F	p-value	β	t	p-value
1	Overall pedagogical skills		0.608	203.907	0.000	0.835	14.280	0.000*
2	Overall pedagogical skills Instruction	Students Engagement in LMS	0.649	126.362	0.000	0.444	9.490	0.001*
						0.282	5.81	0.000*
3	Overall pedagogical skills Interaction		0.659	88.429	0.000	0.650	7.422	0.000*
	Using technology in teaching					0.295	5.855	0.000*
						-0.211	-2.773	0.006*

***Significant @ 0.05**

As shown in Table 14, there was a multiple correlation between the level of effectiveness of LMS, teacher's level of techno-pedagogical skills, and level of students' engagement in LMS. A p value of 0.000 indicates a high level of prediction of the dependent variable (level of effectiveness). The obtained R square of 0.608, 0.649, and 0.659 respectively show that the independent variables (level of techno pedagogical skills, level of effectiveness of LMS in terms of instruction and interaction) explain the variability of the dependent variable (level of student engagement in LMS).

Further, the ANOVA shows that the independent variables instruction and interaction which are determinants of the effectiveness of LMS alongside with the overall techno-pedagogical skills of the teachers- using technology in teaching predicted the dependent variable level of engagement of the student in LMS with f-values of 203.907, 126.362, and 88.429 respectively and a probability value of 0.000 which is less than the 0.05 significance level.

This implies that the independent variables of instruction and interaction under the effectiveness of LMS and the techno-pedagogical skills of the teachers are the drivers of the level of students engagement in LMS in the senior high school, which further means that the effectiveness of the LMS in terms of instructions and interaction and the level of teachers techno-pedagogical skills specifically in terms of using technology in teaching motivates the students to be more engaged in the LMS. Likewise, the skills of the teachers in using technology to teach enhance the instructions and interaction of the students in LMS. Thus, the students are engaged in LMS because of the teachers' pedagogical skills and on how they understand the instructions and their ability to interact with teachers and other learners using the LMS.

IV. Conclusion and Recommendation

The effectiveness of LMS in terms of system content, instruction, interaction, and technology quality was high. While the level of the senior high school teachers' techno-pedagogical skills along with using technology in teaching; using technology in providing learning experiences; and using technology in preparation was very high.

Moreover, the findings showed that the level of the senior high school students' engagement in LMS was very high. Meanwhile, the findings showed that System Content had a moderate correlation with the teacher's level of pedagogical in terms of using technology, using technology in providing learning experiences, and Using technology in preparation with a value of $r=0.508$, $r=0.517$, and $r=0.510$ respectively, while Instruction had a moderate correlation with the teacher's level of pedagogical in terms of using technology, using technology in providing learning experiences and Using technology in preparation with a value of $r=0.508$, $r=0.517$, and $r=0.453$ respectively. Meanwhile, Interaction had a moderate correlation with the teacher's level of pedagogical in terms of using technology, using technology in providing learning experiences, and Using technology in preparation with a value of $r=0.516$, $r=0.483$, and $r=0.455$; lastly Technology quality had a moderate correlation with the teacher's level of pedagogical in terms of using technology, using technology in providing learning experiences and Using technology in preparation with a value of $r=0.458$, $r=0.491$, and $r=0.449$ respectively. Therefore, there was a significant relationship between the level of effectiveness of LMS and teachers' level of techno-pedagogical skills.

In terms of the relationship between the level of effectiveness of LMS and the level of students' engagement in LMS the findings showed that system content, instruction, interaction, and technology quality had a moderate correlation with the students' level of engagement with LMS had a significant relationship with the level of effectiveness of LMS and the level of students' engagement in LMS. In addition. the findings showed that teachers' level of pedagogical skills in terms of technology in teaching, using technology in providing learning experiences, and using technology in preparation is moderately correlated to the student's level of engagement in LMS Therefore, there was a significant relationship between the level of teachers' techno-pedagogical skills and the level of students' engagement in LMS.

Lastly, the findings show that the independent variables instruction and interaction which are determinants of the effectiveness of LMS along side with the overall techno-pedagogical skills of the teachers- using technology in teaching predicted the dependent variable level of engagement of the student in LMS with f-values of 203.907, 126.362, and 88.429 respectively and a probability value of 0.000 which is less than the 0.05 significance level. This implies that the independent variables instruction and interaction under the effectiveness of LMS and the overall techno-pedagogical skills of the teachers are the drivers of the level of students engagement in LMS in the senior high school.

The following recommendations are based on the findings and conclusion of this study:

Since the effectiveness of the LMS is high, the administrators and the teachers are recommended to continue their collaboration in modifying and improving the contents of the LMS so as to maximize its features to the fullest.

To the senior high school students, it is suggested that they must navigate thoroughly all the features of the LMS not only in accessing the lessons, activities, exams, and quizzes, but also utilizing some of its features like announcements, chats, forums, and the like. This is to ensure their engagement and to maximize the use of LMS. Also, the senior high school teachers must fully utilize the LMS for the maximum use of all of its features by the students for better

and improved interaction. It is important that students enjoy and are familiar with all the features of the LMS which will happen if teachers are utilizing them as well.

Furthermore, senior high school teachers should continue updating themselves with techno-pedagogical skills by attending seminars, workshops, and conventions to keep them updated on the latest trends and teaching strategies.

The administrators must support the professional development of the teachers by providing in-house seminar- workshops and/or sending them to conferences focusing the latest techno-pedagogical strategies that can be applied in the classroom and in the utilizing the LMS.

Lastly, future researchers should do further studies with regards to the utilization of the LMS considering other important variables like teachers' technostress and teachers' technology integration skills.

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