# Evaluating Learning Management System and e-Learning Modules in Maritime Education

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## Abstract

*Purpose: Learning Management Systems (LMS) that enable educational institutions to manage all aspects of the digital learning process and getting feedback from actual users through an evaluation process is essential in determining how effective the system works, how convenient it is for the users, and what else needs to be done to improve it for optimum use. This descriptive-evaluative study aimed to determine the level of satisfaction of the instructors and the students with the Learning Management System (called the JeLMS) established by a higher institution in the Philippines as a platform for online instruction at the height of the COVID-19 pandemic. This study also aimed to determine the students' overall satisfaction with the learning modules uploaded to the JeLMS and to identify points that need improvement based on their experiences.*

*Design/Methodology/Approach: The level of satisfaction of the faculty and students with the JeLMS was measured based on the following components: Functionality, Accessibility, Technical Features, and Cognitive Presence utilizing the framework of Anstey, Lauren & Watson, and Gavan (2018). The level of students' satisfaction with the quality of modules was done based on the aspects of Content and Organization, Language, Format, Learning Activities, Learning Materials, Assessment Instruments, and References Used. Data were collected through an online survey with a sample size of 534 students and 63 instructors selected using convenience sampling. The numerical data gathered from the survey were analyzed using the mean, frequency count, and rank. Data collected through the open-ended questions were analyzed thematically to arrive at common responses.*

*Findings: The results revealed that the satisfaction of the instructors and the students with the JeLMS and the learning modules uploaded to it are at high levels. The data also revealed certain problems and difficulties and suggestions for improvement.*

**Key-words:**
*Learning Management System, Online Teaching and Learning, Learning Modules, COVID-19, Maritime Education and Training*

## INTRODUCTION

The COVID-19 pandemic has caused a sudden shift in pedagogy. Face-to-face classes were halted, and educational institutions were drastically pushed to maximize their resources by converting their learning materials into digitized forms. With the extensive application of online learning as one of the approaches for blended instruction, much has been invested in purchasing subscriptions to online platforms and applications and creating institutional Learning Management Systems.

A learning management system (LMS) enables educational institutions to manage all aspects of the digital learning process. As a centralized online education hub, it provides educators with a system for creating and managing their lessons, assigning quizzes, and grading students. It is a software or tool for recording, tracking, and channelizing online course material, tests, and reports (Bashin & Hitesh, 2021). Moreover, it serves as a channel through which teachers and students can openly communicate (Ülker & Yılmaz, 2016). It is considered advantageous as it offers a centralized source of learning and provides schools to save all the learning content in one place instead of having it scattered at different locations (Conde et al., 2014).

After the first few months COVID-19 was declared a pandemic, a university in the Philippines created its own Learning Management System, referred to as the JeLMS, to be utilized in all its academic units. The JeLMS is an alleyway for online learning, specifically training and instructions accessible to the university. This learning technology is well-designed for 2$^{1st}$-century learners, providing easy access to the lessons and substantial knowledge anytime-anywhere with ease. The platform is *Moodle*-based, enabling teachers to create e-courses easily, add activities and assignments, and keep an eye on their students' progress. It also allows teachers and students to communicate and encourage collaboration in forums and discussions. The platform is multi-faceted and flexible, so there is no need to get confused when learning the way around for the first time. The online functionality of JeLMS provides educators and students with a more convenient way to deliver and access quality instructions apart from the traditional way or face-to-face teaching mode. It was designed to provide teachers and students with a centralized online education platform for managing lessons and administering various assessments such as quizzes and periodic examinations. Course shells containing learning modules for different courses were uploaded to the system. However, since it is a new system, it needs to be evaluated after its testing phase. According to Wang and Chen (2009), Learning Management Systems must be assessed using a principled approach. An evaluation of a 'change technology' is essential. When conducting the evaluation, it is important to engage the faculty and students on their feelings and attitudes towards the new platform.

This study aimed to determine the level of satisfaction of the instructors and the students with the JeLMS to determine how effective the system works based on certain parameters, how convenient it is for the users, and what else needs to be done to improve it for optimum use. This investigation also aimed to determine the students' level of satisfaction with the learning modules uploaded to the JeLMS and to identify the points that need to be improved based on their experiences.

## THEORETICAL FRAMEWORK

The topic of this paper can be viewed in the context of Vygotsky's Social Development Theory, John Dewey's Theory of Learning, and Jean Piaget's (1975) Theory of Assimilation and Accommodation cited in Bormanaki and Khoshhal (2017) which describes teaching and learning as a complex interactive social phenomenon between teachers and students (Crawford, 1996 cited in Picciano, 2017).

Vygotsky's Social Development Theory allows us to view teaching and learning in a sociocultural context in which teachers and students interact in shared experiences. Tools and other mechanisms may be devised to facilitate interaction with one another. Taken in the context of the current learning environment, this implies adopting methods and strategies appropriate to the learners' needs during this pandemic. As the nature of the learning environment shifts according to existing realities, teachers and students are also expected to adapt to these changes by using learning tools to facilitate the delivery of instruction.

Moreover, Dewey's Theory of Learning saw learning as a series of practical social experiences in which learners learn by doing, collaborating, and reflecting with others. The use of reflective practice by both learner and teacher is a pedagogical cornerstone for interactive discussions that replace straight lecturing in face-to-face or online classes. Students must be exposed to a learning environment that simulates realistic experiences.

Dewey's theory is further strengthened by Piaget, who opined that learning as a process only makes sense in situations of change. Therefore, learning is partly

knowing how to adapt to these changes. With the pandemic causing the inevitable shift in the mode of instruction from in-class to remote, both the teachers and the students are expected to manage and cope with the changes in the learning environment.

## CONCEPTUAL FRAMEWORK

Several experts in evaluating LMSs and other eLearning systems, tools, and platforms offer insightful concepts on which the concept of this study was built. Kabassi et al. (2016), citing Singh (2010), opined that Information and Communication Technologies (ICTs) make learning more comprehensible and efficient. The same source claims that using ICT tools and systems facilitates better comprehension, helps set clear goals, and gives them self-paced learning and greater flexibility.

However, Conklin (2020) notes that evaluating a technology change, such as the JeLMS, is critical. When conducting an evaluation, the designers may want to engage the direct users of the system, such as the faculty and the students in this study, to gather their feelings and attitudes toward the new platform. The evaluation must consist of designing the survey instrument and deciding when the data collection should occur, how the data will be analyzed, and how the results will be used and communicated.

Anstey and Watson (2018) offer educators a framework with criteria and levels of achievement to assess the suitability of an e-learning tool for their learners' needs, learning outcomes, and classroom context. This rubric contains the following criteria: Functionality, Accessibility, Technical Features, and Cognitive Presence.

*Functionality* considers a tool›s operations or affordances and the quality or suitability of these functions to the intended purpose—that is, does the tool serve its intended purpose well? In the case of e-learning tools, the intended purpose is classroom use. Its sub-components include Scale (Can it accommodate the size and nature of the classroom environment?), Ease of Use (Is the tool intuitive and easy to use?), Technical Support / Help Availability (Does it offer timely technical support to help students regulate self-learning?), and Hypermediality (Does it provide multiple forms of media such as audio, video, and textual communication channels that support and encourage instructors and students to engage and interact with?)

*Accessibility* It is measured through the system's adherence to accessibility standards, user-focused participation, required equipment, and use cost. To be accessible, the system must be designed to address the needs of diverse users, their various literacies, and capabilities, thereby widening opportunities for participation in learning does not require equipment beyond what is typically available to instructors and students (computer with built-in speakers and microphone, internet connection), and does not impose any unreasonable financial obligation to the students.

As to *Technical Features*, the system must allow users to archive, save, or import and export content or activity data in various formats. It must have the capacity to support learning and provides opportunities for communication, interaction, and transfer of meaning between instructors and students. It should contain easy-to-use features that significantly improve an instructor's ability to be present with learners via active management, monitoring, engagement, and feedback. It should allow the instructors to monitor learners' performance on various responsive measures that can be accessed through a user-friendly dashboard.

Finally, *Cognitive Presence* requires the system to enhance engagement in targeted cognitive tasks that are used to be overly complex or challenging to manage and facilitate learners' exercise of higher-order thinking skills, and regularly receive formative feedback on learning (i.e., they can track their performance, monitor their improvement, test their knowledge).

On the students' level of satisfaction with the quality of learning modules uploaded to the JeLMS, the following components were considered: Content and Organization, Language, Format, Learning Activities, Learning Materials, Assessment Instruments, and References/Sources Used.

On *Content and Organization*, the learning modules must specify the topics and the learning outcomes and align with those provided in the course outline. Their contents must be systematically presented and easy to follow.

The *Language* used in the modules must be free from grammatical, mechanical, and spelling errors. It must be appropriate to the students' level of comprehension, and the instructions and discussions must be clear and easily understood.

As regards the *Format*, the modules in all courses must follow the same template in all parts. Mechanical standards for spacing, highlighting, capitalization, margining, and use of punctuation must be properly observed, and the illustrations must be legible and

properly labeled.

Furthermore, the *Learning Activities* should match the intended learning outcomes, be varied and interesting and engage students' active participation and use of higher-order thinking skills.

As to the *Learning Materials*, the modules must include interesting graphics such as diagrams, photos, charts, graphs, and other visual presentations. The lessons in the modules must encourage the use of online resources, such as links to related videos and literature. Also, the learning materials used in the modules should be carefully selected and relevant to the topics.

On the aspect of *Assessment*, the assessment instruments provided in the modules should match the intended learning outcomes. The items included in the assessments must be carefully prepared and free from errors. The instructions in the assessments must be clearly stated and easy to follow. Lastly, the types of assessment must engage students to think critically.

Regarding *References/Sources Used*, the discussions in the modules must be strengthened by a wide use of references/sources. The references/sources used in the modules must be substantial and up to date, and modules must use accessible online sources aside from textbooks and manuals.

The evaluation frameworks discussed above were considered in evaluating the JeLMS and the quality of the learning modules uploaded.

## STATEMENT OF THE PROBLEM

This study aimed to evaluate the JeLMS as a learning management system and the learning modules that were uploaded to it to identify points that need to be improved based on the users' experiences.

Specifically, the following questions were raised in this investigation.

1. What is the level of satisfaction of the faculty with the JeLMS in terms of the following aspects?
   a. Functionality
   b. Accessibility
   c. Technical Features
   d. Cognitive Presence
2. What is the level of satisfaction of the students with the JeLMS in terms of the same aspects?
3. What problems and difficulties did the faculty and students experience using the JeLMS?
4. What suggestions do they have to improve the system?

5. What is the students' level of satisfaction with the quality of learning modules uploaded to the JeLMS in terms of the following aspects?
   a. Content and Organization
   b. Language
   c. Format
   d. Learning Activities
   e. Learning Materials (Graphics, Videos, and Related Articles)
   f. Assessment Instruments
   g. References Used
6. What suggestions do they have to improve the modules uploaded to the JeLMS?

## METHODOLOGY

Descriptive-survey and descriptive-evaluative designs were employed to determine the level of satisfaction of the instructors and the students with the JeLMS, as well as the level of satisfaction with the learning modules uploaded to the system from the point of view of the students.

Data collection from a sample size comprising 534 students and 63 instructors started three months after the series of quarantines took place, preventing schools from holding face-to-face instruction. These respondents were selected using convenience sampling (Bashin, 2020) but reaching out to as many instructors and students as possible.

The instrument for measuring the respondents' satisfaction with the JeLMS was based on the parameters of Anstey and Watson (2018) in their instrument titled *"Rubric for eLearning Tool Evaluation,"* namely, Functionality, Accessibility, Technical Features, and Cognitive Presence. This instrument was designed in two ways: one from the instructors' point of view and the other from the students'. The same set of parameters was used.

A researcher-made survey instrument was used to determine the students' level of satisfaction with the quality of learning modules uploaded to the JeLMS. This instrument was presented to two experts in the field of Information Technology to validate its content in terms of its relevance in the context of the study. It was also presented to three field experts, including the Academic Deans of the college programs and the Principal of the Basic Education Department. The criteria of Good and Scates, as illustrated in Oducado (2020), were used for the face and content validation of the instrument. Corrections and suggestions were reflected on the instruments before they were posted online through Google Forms.

Since the face-to-face interview was not possible

during this period, the link to the survey was sent to the target respondents, who were asked to accomplish it within two weeks. To reach out to as many respondents as possible, answering the survey was facilitated by the respective Deans and the Principal among their instructors in the department. For the students, the assistance of the faculty advisers was a big help.

Mean was used to determine the level of satisfaction of the faculty and students with the JeLMS and the learning modules. The level of satisfaction was rated and described using a five-point Likert scale as shown below:

| 5 | Strongly Agree | Very High Level of Satisfaction |
|---|---|---|
| 4 | Agree | High Level of Satisfaction |
| 3 | Moderately Agree | Moderate Level of Satisfaction |
| 2 | Disagree | Low Level of Satisfaction |
| 1 | Strongly Disagree | Very Low Level of Satisfaction |

To find out the specific problems and difficulties experienced by the faculty and students using the JeLMS, frequency count and rank were used. Data were counted based only on the responses of those who answered this part of the survey. Thematic analysis was used to analyze the suggestions given by both groups of respondents.

## RESULTS AND DISCUSSION

### Level of Satisfaction with the JeLMS

Most of the instructors and the students have expressed a high level of satisfaction with the University's Learning Management System (JeLMS) on all indicators of the criteria (Table 1), with the highest mean pointing to Technical Features (m = 3.68). This means that the system has highly satisfied the users in terms of the following features: it allows users to archive, save, or import and export content or activity data in a variety of formats; it can support learning and provides opportunities for communication, interaction, and transfer of meaning between instructors and students, it has easy-to-use features that would significantly improve an instructor's ability to be present with learners via active management,

monitoring, engagement, and feedback, and it allows the instructor to monitor learners' performance on a variety of responsive measures that can be accessed through a user-friendly dashboard. Hogle (2019), in her article "Improve Learning Management System Courses with User Feedback" explains that soliciting learner feedback and asking the right questions can drive improvements in existing courses. It can also spark the creation of new learning resources. However, she also pointed out that learning managers can obtain meaningful survey results by seeking feedback on the content. One approach, according to her, is to ask learners to identify specific elements of the system that were most—or least—useful. Providing a text box where learners explain their responses can offer valuable information on improving a course or the system used in delivering the course.

Table 1: Level of Satisfaction with the JeLMS

| Criteria | Instructors | | Students | |
|---|---|---|---|---|
| | Mean | Interpretation | Mean | Interpretation |
| Functionality | 3.65 | High | 3.57 | High |
| Accessibility | 3.63 | High | 3.58 | High |
| Technical Features | 3.82 | High | 3.68 | High |
| Cognitive Presence | 3.63 | High | 3.53 | High |
| Total | 3.68 | High | 3.59 | High |

### Problems and Difficulties Experienced by the Instructors and the Students with the JeLMS

The overall numerical evaluation of the JeLMS has pointed to a high level of satisfaction on all indicators. However, data obtained from the open-ended questions in the survey instrument were able to capture first-hand feedback which the figures failed to reveal. This usually happens in surveys where the respondents would normally rate the items based on their general judgment; and, unless they are asked what the problem is, their numerical responses could not really provide a clear picture of the situation. So, in addition to the survey in Likert scale, this question was also asked: *"What problems and difficulties did you experience in using the JeLMS?"*

Tables 2 and 3 show that sixty-seven percent of the instructors and 71% of the students reported experiencing occasional problems in using the system, which was commonly experienced as system lagging/ error, difficulty logging back if the connection is lost, and some data being difficult to recover when the system is down. The rest of the issues mentioned had something to do with its features being difficult

to follow, particularly when making quizzes and other types of assessments, and the complexity of the steps, that is, "many steps are required to get the task done," quoting one of the respondents.

Table 2: Problems and Difficulties Experienced by the Instructors in Using the JeLMS

| Problems and Difficulties Experienced | f | Rank |
|---|---|---|
| Many steps are required to get the task done. | 2 | 8 |
| If the connection is lost, I cannot log back in. | 7 | 2 |
| Not user-friendly. | 3 | 6.5 |
| Some data cannot be recovered when the system is down. | 6 | 3 |
| Some quiz features, like the dropbox image, are difficult to follow. | 5 | 4 |
| System lagging/error/cannot be accessed/overload | 28 | 1 |
| Inaccurate system of enrolling students (e.g., some students have two or more accounts) | 3 | 6.5 |
| Limited/Unstable internet connectivity | 4 | 5 |

Almost the same problems were noted from students' feedback, with system lagging/error ranked on top, followed by sudden errors when taking quizzes and exams. The third problem was not mainly about the JeLMS but internet connectivity issues. Other problems were the unavailability of notification to students if they missed performing an activity. A few have also expressed that the time allotted to take the assessments was insufficient. Moreover, there was a problem retrieving what had already been encoded if a sudden error in the system happened.

Table 3: Problems and Difficulties Experienced by the Students in Using the JeLMS

| Problems and Difficulties Experienced | f | Rank |
|---|---|---|
| System lag/error/ cannot be opened/interrupted | 162 | 1 |
| Sudden error while/when taking quiz/exam | 131 | 2 |
| Connectivity issues | 65 | 3 |
| Feedback features are not available, e.g., It does not notify the student of what he has missed or what subject he still needs to answer. | 22 | 4 |
| There needs to be more time allotted for assessments. | 10 | 6 |
| Data retrieval is not possible anymore once a sudden system error is experienced. | 20 | 5 |

Specifically for students with limited resources, the following problems are perennial: getting disconnected in the middle of their classes, experienced by 84 (16%); difficulty in understanding the lessons discussed by their teachers, expressed by 72 (13%); difficulty in understanding the instructions by 37 (7%); and internet load is not enough to use the video features of the application, expressed by 22 (4%) of the students (Figure 1). These challenges were found in the study of Chung et al. (2020), who noted that the biggest challenge for degree students is internet connectivity. For diploma students, it is difficult to understand the subject's content.
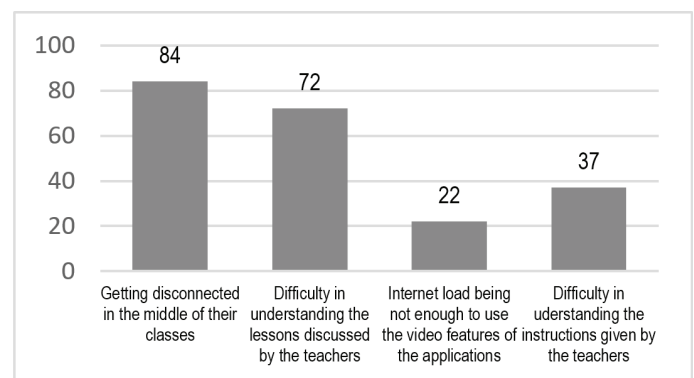


Figure 1. Challenges and Difficulties Experienced by Students with Limited Internet Resources

## Suggestions of the Instructors and Students on the JeLMS

The instructors' suggestions centered on improving the system based on the problems encountered by the users, providing more hands-on tutorials on using the different features of the system focusing on the difficulties identified, improving the internet connectivity (better and faster bandwidth for a quicker and stabler connectivity), providing more user-friendly features, allowing alternative platforms for meeting the class, sending materials to students, and giving of assessments, rigorous monitoring of traffic flow and updating of the website from time to time to make it more efficient, providing a separate LMS per campus to avoid system overload, and assigning technical support staff to address problems right away/provide an immediate response to queries.

Teachers at this time of the pandemic are taking on all types of pressures, from ensuring that their students get the best education to cope with their technical difficulties in using online learning systems and devices. Gleaning on the comments expressed by the instructor-respondents, they need technical assistance as much as possible. They also need to be trained further on using the JeLMS and its features. With the multiple roles they are expected to perform as they implement blended learning, with online learning being one of the approaches, preparing, planning, and executing tasks expected out of them add much pressure, and the lack of time doubles it. For this, they need a Learning Management System that is easy to use and would not add more to their stress level. They need a good flexible teaching platform that can help them better contribute to quality education and the overall success rates of students (Huang et al., 2020).

There is also the challenge of how to keep the students engaged in the online class (Online Learning Challenges and Solutions, 2021) by using tools and multiple types of learning approaches such as videos, live classes, discussions, relevant articles, and other strategies and materials for better learning outcomes, but only if these tools would not cause a system overload. The instructors also expressed this concern. The same source has discussed the challenge of dealing with technical issues using LMSs. Many teachers struggle with technical issues that are unavoidable and cause stress. They become helpless if technical errors come in the middle of the live session or communication with students. Aside from providing technical support for solving problems that can interfere with the learning process, the article suggests upgrading computer systems with applications and software that can help effectively deliver learning with a high-speed internet connection.

Moreover, the students have expressed the need to set more extended time for taking online quizzes and exams, organizing the learning modules for specific sections to avoid mix-ups, the inclusion of saving features per page so that if a sudden error occurs, data/information already entered can still be retrieved, allowing students other alternative ways of taking quizzes or exams if they miss taking them on the specific time due to technical/connectivity problems, improving the memory database so it could accommodate a massive quantity of users to eliminate lagging in the website, simplifying and reducing the system's features to make it more user-friendly for teachers and students, and sending notifications directly to students' Gmail accounts if teachers have uploaded something that calls for urgent attention.

## Students' Level of Satisfaction with the Quality of Learning Modules Uploaded to the JeLMS

Moving further, students have expressed high satisfaction with the quality of learning modules uploaded to the JeLMS. Table 4 shows that most respondents expressed high satisfaction with all indicators of each aspect. These aspects include Content and Organization, Language, Format, Learning Activities, Learning Materials (graphics, videos, and related articles), Assessment Instruments, and References Used.

Table 4: Students' Level of Satisfaction with the Quality of Modules Uploaded to the JeLMS

| Aspects of the Modules | Mean | SD | Interpretation |
|---|---|---|---|
| Content & Organization | 3.88 | 0.87 | High |
| Language | 3.76 | 0.87 | High |
| Format | 3.76 | 0.87 | High |
| Learning Activities | 3.74 | 0.88 | High |
| Learning Materials | 3.79 | 0.86 | High |
| Assessment Instrument | 3.75 | 0.83 | High |
| References Used | 3.83 | 0.80 | High |
| Total | 3.79 | 0.88 | High |

## Students' Suggestions to Improve the Learning Modules

In another open-ended question, the students were asked, "*What suggestions do you have to further*

*improve the learning modules uploaded to the JeLMS?"* For their ease and convenience, they have expressed the following suggestions:

1. Simplify the modules.
2. Set a maximum number of pages for each module (others are too crowded/too long for students to comprehend; some are simply copy-pasted from other sources without any attempt to simplify).
3. Align quizzes/exams with the learning objectives and contents of the modules discussed.
4. Provide students with PDF copies of the modules.
5. Instructors to provide their own video-recorded lectures or demos of the topics.
6. Make the modules more interesting.
7. Use the same template/format of modules in all subjects.
8. Organize and edit materials (modules, quizzes, exams) to remove grammatical or mechanical errors before uploading them.
9. Teachers to discuss the learning materials (modules, videos), not just send them.
10. Offer other relevant learning materials and references (links to videos, articles, etc.) to supplement the lessons.
11. Provide a manageable number of quizzes/activities.

## CONCLUSION

Relative to the first and second research questions, the results revealed a high level of satisfaction of the instructors and the students with the JeLMS and the learning modules uploaded to it. However, the high level of satisfaction with the JeLMS and the learning modules does not negate the fact that the users had experienced occasional problems and difficulties in utilizing them.

On the third objective which is to identify the problems and difficulties experienced by the users, it was found that while the JeLMS and the modules uploaded to it had been helpful, their utilization needs to be improved because of some technical issues with the system, poor internet connectivity, and technical glitches during the actual use of these online tools and materials. Some of the learning modules already uploaded to the system may need to be taken down and reviewed further before being re-uploaded to the system.

Suggestions to improve the JeLMS (research question 4) expressed by the faculty centered more on improving the JeLMS based on the problems encountered by the users, providing more hands-on training to familiarize the instructors with its features, and assigning technical support staff to provide immediate assistance if technical glitches may arise, among others. Some of the students' suggestions include setting more time for taking online quizzes and exams, organizing the learning modules to avoid mix-ups, adding saving features per page to ensure retrieval of encoded contents in case of a system breakdown, and simplifying the system's features to make them more user-friendly.

On the fifth objective which is to determine the students' level of satisfaction with the quality of learning modules uploaded to the JeLMS, a high level of satisfaction was noted on all aspects. However, they expressed numerous suggestions, particularly on how to improve these learning modules in terms of content and organization and format.

Given the findings of this study, digital transformation should be part of the university's strategic plan in the next five years. After experiencing the pandemic, the world has slowly welcomed the idea of adopting the Hybrid and HyFlex learning environment which allow the use of multiple teaching modalities. In this digital era, the University needs to develop contingency plans that could provide the resources necessary to keep its operations going. It needs to set plans and strategies for better and more effective delivery of instruction as it welcomes the crucial role of technology and the inevitable conversion of learning materials into digital form. As García-Peñalvo et al. (2020) put it, a higher education institution should have a comprehensive plan with viable initiatives focused on people and empowered by technology. The use of technology is the medium for introducing improvements and needed change. The University's digital transformation means embracing the digital society in which we live, creating a more transparent place that promotes equality, inclusion, and participation, for the good of the school and for the benefit of the students that it serves.

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