





Tracking Student Engagement through Data Analytics: Moodle's Usage Shift as Face-To-Face Classes Opportunities Increase



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ABSTRACT

Learning Management Systems (LMS), such as Moodle, have become increasingly important in delivering education in recent years. With the advent of technology and the outbreak of the COVID-19 pandemic, the use of LMS has taken on a new dimension, as most teaching and learning rely on their capabilities. The present study aimed to investigate the impact of the increase in the opportunities for face-to-face classes on the level of student engagement on Moodle. The study used a sequential explanatory research design to explore students' engagement on Moodle, and data was gathered through questionnaires. Quantitative data was coded and analysed using descriptive statistics. The results showed a statistically significant increase in the mean engagement of students in Moodle between the years 2021 and 2022, with a mean increase of 6.15 hours. The study supports previous research which revealed that using educational technology, such as Moodle, can positively impact student engagement in the classroom. However, despite the widespread acceptance that higher education will not be the same post-pandemic, there is limited research to support this assumption. This study contributes to the limited literature by providing evidence on the impact of face-to-face classes on student engagement on Moodle. It highlights the need for further research to determine the sustainability of the improvement over time.

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INTRODUCTION

In recent years, the field of education has witnessed a profound shift in its delivery, with online learning platforms and virtual classrooms becoming the norm, particularly in the wake of the COVID-19 pandemic. As a result, Learning Management Systems (LMS), such as Moodle, have become indispensable tools for institutions of higher learning. A critical aspect of LMS functionality is its potential to facilitate student engagement, which has sparked scholarly interest in exploring the nature of student engagement, particularly in relation to online learning. Furthermore, other studies in different disciplines have taken various approaches and methods to investigate student engagement online. For instance, Zelhendri, and Ariani emphasize the effectiveness of using social media to increase student engagement, while also highlighting the positive impact of project-based online learning methods that

can increase student engagement between 60.8-89.5%.¹ Similarly, Juan used the number of visits and student time spent online from institutional LMS data to determine the effectiveness of online teaching on student engagement using multivariate analysis of variance. The results of this study revealed that student-generated questions were an effective learning tool for promoting engagement in an online nursing leadership course.² These studies collectively demonstrate the multifaceted nature of student engagement online and the importance of exploring it from various angles to develop effective strategies that can foster engagement in online learning environments.

Parida et. al, capture this complexity and argue that student engagement is a multifaceted and complex construct that is crucial for student-centered learning and teaching-related outcomes. They suggest that aspects of student engagement are inextricably linked to the quality assurance of university education and that the COVID-19 pandemic has intensified the need for effective online teaching and learning, and increased interest in student engagement in online learning (SEOL).³ However, the authors contend that SEOL in Australian universities has become a buzzword and that there is a dearth of clarity on what an effective student engagement policy should look like and what constitutes effective SEOL. Hence, further research is necessary to improve our understanding of this crucial issue and develop effective policies and strategies to promote student engagement in online learning environments. The research gap identified in this study is the lack of understanding of how the increase in opportunities for face-to-face classes affects the level of student engagement in Moodle. Previous studies have investigated the relationship between time spent online and student engagement and have found that time spent online is positively associated with student engagement. However, these studies did not examine the impact of face-to-face classes in student engagement on Moodle post-pandemic. Despite these cited challenges – the literature captures a number of benefits of accelerated online learning due to the pandemic. These benefits and lessons gained include students showed greater acceptance of online architecture education during the pandemic, especially for lecture-based courses; students generally agreed on the advantages of online education, including the adequacy of electronic course materials, flexibility in time management, greater flexibility in contact with instructors, and receiving fair feedback about the progress of design projects.⁴

The present paper addresses the lack of understanding of how the increase in opportunities for face-to-face classes affects the level of student engagement on Moodle, which is the LMS employed by the university under study. While previous research has explored the relationship between time spent online and student engagement and has found a positive association between the two, this study seeks to systematically track shifts or changes in student engagement levels on Moodle as opportunities for face-to-face classes increase post-pandemic. In light of the aforementioned studies, the present paper seeks to contribute to the existing literature by investigating if there are any changes or shifts in student engagement with Moodle usage as opportunities for face-to-face classes increase. The question this research seeks to answer is this; is there a difference in the amount of time spent on Moodle by students and staff in 2021 and 2022 as face-to-face class opportunities increase? This inquiry is crucial as it is widely accepted that the landscape of higher education has been transformed by the pandemic, and pedagogical gains made from emergency remote learning can be lost if institutions of higher learning are not intentional in their approach. Thus, the present study aims to systematically track shifts or changes in student engagement levels on Moodle, which is the LMS employed by the university under study. The hypothesis for this study is as follows:

¹ Zelhendri Zen et al., “Academic Achievement: The Effect of Project-Based Online Learning Method and Student Engagement,” *Heliyon* 8, no. 11 (November 2022): e11509, <https://doi.org/10.1016/j.heliyon.2022.e11509>.

² Samantha Juan, “Promoting Engagement of Nursing Students in Online Learning: Use of the Student-Generated Question in a Nursing Leadership Course,” *Nurse Education Today* 97 (February 2021): 104710, <https://doi.org/10.1016/j.nedt.2020.104710>.

³ Subhadarsini Parida et al., “Rhetoric and Realities in Australian Universities of Student Engagement in Online Learning: Implications for a Post-Pandemic Era,” *The International Journal of Management Education* 21, no. 2 (July 2023): 100795, <https://doi.org/10.1016/j.ijme.2023.100795>.

⁴ Omar S. Asfour and Amer M. Alkharoubi, “Challenges and Opportunities in Online Education in Architecture: Lessons Learned for Post-Pandemic Education,” *Ain Shams Engineering Journal* 14, no. 9 (September 2023): 102131, <https://doi.org/10.1016/j.asej.2023.102131>.

Null Hypothesis (H₀): There is no significant difference in the amount of time spent on Moodle by students and staff in 2021 and 2022 as face-to-face class opportunities increase

Alternative Hypothesis (H_a): There is a significant difference in the amount of time spent on Moodle by students and staff in 2021 and 2022 as face-to-face class opportunities increase.

LITERATURE REVIEW

In recent years, there has been a significant increase in research on the use of Moodle and its impact on education. Much of the literature has focused on how Moodle has been used to enhance teaching and learning and how it has been integrated into different educational contexts; for example, some studies have explored how Moodle has been used to support student engagement, foster collaboration and communication, and provide personalised learning experiences.⁵ The pandemic has brought about a new set of challenges for the world of education. With the closure of schools and universities, many institutions had to quickly adopt online learning platforms like Moodle to continue providing education to students.⁶ In this context, there have been several studies that have looked at the role of Moodle in facilitating remote learning during the pandemic; for example, one study found that Moodle was effective in supporting student engagement and motivation during remote learning and that it was a helpful tool for promoting student-teacher interaction and communication.

Despite the positive impact that Moodle has had on education, there have also been concerns about the limitations and challenges that the platform. For instance, some studies have found that Moodle can be difficult to use and navigate, particularly for students new to online learning. Additionally, there have been concerns about the quality of the content delivered through Moodle and the need for more effective strategies to assess student learning¹⁰. In conclusion, the literature on Moodle and its impact on education is vast and diverse. While the literature highlights the positive impact that Moodle has had on education, it also raises concerns about the limitations and challenges that the platform presents.

Equally important is understanding students' levels of engagement in LMS platforms such as Moodle. The literature that attempts to understand student engagement can be broadly divided into two categories, that is, academic engagement and social engagement. Academic engagement refers to students' level of involvement in their academic experiences, such as participating in class discussions, completing homework assignments, and seeking help when needed. Social engagement refers to a student's involvement in extracurricular activities, such as clubs, sports teams, and community service. However, the current paper focuses on student academic engagement, measured in terms of time spent online on LMS (Moodle). Thus, the current study's use of time spent online as a measure of student engagement is informed by literature.

By examining the change in Moodle use in a post-pandemic world, this study aims to contribute to the existing body of literature by exploring the role of Moodle in facilitating remote learning and what this means for the future of online education. The findings of a study conducted by Syarif et.al.,¹² in Indonesia titled "Using Moodle Learning Management System in Teaching from Distance Learning to the E-learning 5.0 of New Technology" revealed that lecturers who made use of Moodle in Teaching from distance learning to the E-learning 5.0 of new technology are complete enough to engage users and to enable them to work optimally on the assignment questions provided.⁷ The study further found that the use of LMS such as Moodle to teach "Information Technology and Process Modeling" in schools increased students' engagement and allowed for autonomous work in the teaching and learning environment, hence the need to engage students in the use of Moodle.

Literature has shown that a distinction between critical and transformational service learning remains necessary in the current generation due to unforeseen circumstances of the nature thereof as

⁵ Maria-Dorinela Dascalu et al., "Before and during COVID-19: A Cohesion Network Analysis of Students' Online Participation in Moodle Courses," *Computers in Human Behavior* 121 (August 2021): 106780, <https://doi.org/10.1016/j.chb.2021.106780>.

⁶ Konomu Dobashi et al., "Learning Pattern Classification Using Moodle Logs and the Visualization of Browsing Processes by Time-Series Cross-Section," *Computers and Education: Artificial Intelligence* 3 (2022): 100105, <https://doi.org/10.1016/j.caeai.2022.100105>.

⁷ Irman Syarif et al., "Using Moodle Learning Management System in Teaching from Distance Learning to the E-Learning 5.0 of New Technology," *Journal of Physics: Conference Series* 1933, no. 1 (June 1, 2021): 012124, <https://doi.org/10.1088/1742-6596/1933/1/012124>.

demonstrated in early 2020.⁸ The need to make use of a learning management system such as Moodle cannot be underestimated. This is supported by a study by Syarif et al., which confirms that in Moodle there is a "Seminar" feature that can be used to decide on the degree of production of each segment.⁹ Engagement refers to students' level of involvement in their academic experiences, such as participating in class discussions, completing homework assignments, and seeking help when needed. This will help close the current gap existing in literature by examining the shifts or changes in student engagement on Moodle as the opportunities for face-to-face classes increase, thus being the main objective of the current study.

Currently, global higher education institutions have increasingly adopted information and communication technologies (ICTs) and learning management systems such as the Internet tools for teaching, curriculum development, staff development and student learning engagement.¹⁰ There is no doubt that these institutions extensively use learning management systems like ICTs and the Internet to develop alternative options for delivering courses to students as tasks that entail guaranteeing the effective use of technologies in facilitating communication and activities that support education.¹¹

In the same way, the findings also affirm other studies in that E-Learning environments may contribute to the teaching and learning process if the integration is done within the framework of proper pedagogy required to increase the understanding of the relationship between e-learning and motivational processes since it is necessary to gain a better understanding of learning materials that are developed to increase motivation.¹²

This means that for every LMS, such as Moodle, to work effectively and efficiently, correct teaching and learning processes should be maintained for good student engagement. However, the current study is not about using the internet but how to engage students in the use of Moodle in teaching and learning so as to support students in employing such innovations to ensure that the learning process continues to move forward, regardless of whether there is a pandemic or not. This also takes into account an increase in opportunities for face-to-face classes. When this system is proven to be an efficient information source, lectures and students can use it extensively as a reliable teaching resource.

In a similar study conducted by Saleem et al., one faculty group used Moodle and the other did not use Moodle.¹³ In the group that used Moodle, performance expectancy, effort expectancy, social influence, facilitating conditions and behavioural intention were positively related, thereby influencing the faculty members' use behaviour. This implies that the use of Moodle is a very important tool for student engagement since numerous pedagogical studies have been devoted to the potential use of Moodle as an educational platform for engagement to enhance effective teaching and learning.¹⁴ Though the use of Moodle as LMS has helped in student engagement, literature has shown that there are four additional factors such as gender, age, experience and the voluntariness of use that all affect Moodle's

⁸ Christoph Schank and Jantje Halberstadt, "Teaching Transformative Service Learning," in *Transforming Entrepreneurship Education* (Cham: Springer International Publishing, 2023), 3–21, https://doi.org/10.1007/978-3-031-11578-3_1.

⁹ Syarif et al., "Using Moodle Learning Management System in Teaching from Distance Learning to the E-Learning 5.0 of New Technology."

¹⁰ Kenneth Nwanua Ohei and Roelien Brink, "Web 3.0 and Web 2.0 Technologies in Higher Educational Institute: Methodological Concept towards a Framework Development for Adoption," *International Journal for Infonomics* 12, no. 1 (March 30, 2019): 1841–53, <https://doi.org/10.20533/iji.1742.4712.2019.0188>.

¹¹ Uthman Alturki and Ahmed Aldraiweesh, "Application of Learning Management System (LMS) during the COVID-19 Pandemic: A Sustainable Acceptance Model of the Expansion Technology Approach," *Sustainability* 13, no. 19 (October 3, 2021): 10991, <https://doi.org/10.3390/su131910991>.

¹² Simon Adjei Tachie, "Meta-Cognitive Skills and Strategies Application: How This Helps Learners in Mathematics Problem-Solving," *EURASIA Journal of Mathematics, Science and Technology Education* 15, no. 5 (March 5, 2019), <https://doi.org/10.29333/ejmste/105364>; Naifa E. Saleem, Mohammed N. Al-Saqri, and Salwa E.A. Ahmad, "Acceptance of Moodle as a Teaching/Learning Tool by the Faculty of the Department of Information Studies at Sultan Qaboos University, Oman Based on UTAUT," *International Journal of Knowledge Content Development & Technology* 6, no. 2 (December 31, 2016): 5–27, <https://doi.org/10.5865/IJKCT.2016.6.2.005>.

¹³ Saleem, Al-Saqri, and Ahmad, "Acceptance of Moodle as a Teaching/Learning Tool by the Faculty of the Department of Information Studies at Sultan Qaboos University, Oman Based on UTAUT."

¹⁴ Ayanda Pamela Deliwé, "The Use of Learner Management System (MOODLE) in Promoting Teaching and Learning," *Universal Journal of Educational Research* 8, no. 12B (December 2020): 8383–92, <https://doi.org/10.13189/ujer.2020.082644>; Nurassyl Kerimbayev et al., "Virtual Educational Environment: Interactive Communication Using LMS Moodle," *Education and Information Technologies* 25, no. 3 (May 1, 2020): 1965–82, <https://doi.org/10.1007/s10639-019-10067-5>.

adoption. The current study, therefore, examines the shifts or changes in student engagement on Moodle as the opportunities for face-to-face classes increase.

METHODOLOGY

The study used a sequential explanatory research design to explore students’ engagement on Moodle, and quantitative data was gathered from a survey, administered questionnaires to 1170 university students randomly selected for this study. The total number of participants in this study was 1770 university students. The sampling method used was non-probabilistic. The whole population of students included students from four schools, namely the School of Economic and Management Sciences (EMS), the School of Education (EDU), the School of Humanities (HUM) and the School of Natural and Applied Sciences (NAS).

Data for this study were collected from Moodle logs from a total of 85 courses in three years of study (i.e., first, second, and third year). The logs were obtained from a single university that uses Moodle as its primary online learning platform. The total sample size for this study was 1,770 students who were enrolled in the courses for the period 2021 and 2022. The courses were categorised into four distinct subject matter categories: EMS, HUM, EDU, and NAS. The distribution of the sample per category was as follows: EMS (n=210), HUM (n=287), EDU (n=885), and NAS (n=388). The categorisation of the courses was based on the information provided in the course description and confirmed by the course instructors. To measure student engagement, the researchers used the time spent by students on the Moodle platform as our primary measure. They extracted the Moodle log data for each course and computed the total amount of time each student spent on the platform. They then calculated the average time spent by students on Moodle for each course, which served as the primary measure of student engagement. They also performed descriptive statistics to summarise the time spent on Moodle by students across the four categories of courses. They also performed inferential statistics, for hypothesis testing, then conducted independent samples t-tests to compare the mean time spent on Moodle between each for the two years 2021 and 2022. All ethical considerations were observed before the start of the study since research ethics is an essential component of all research activities in any study. For example, participant confidentiality was ensured, and their privacy was also respected within this study. The students were told that their participation in this study was totally voluntary and only willingness participants who gave their consent to participate in this study were aloud and had every right to withdraw from the study at any point in time without any prejudice.

RESULTS /FINDINGS

This section presents the results of the paper in testing the hypothesis, which states that there are no differences in students' levels of engagement during the year of the pandemic and post (2021 and 2022, respectively). To measure the foregoing engagement, the current paper used time students spent on Moodle for 2021 and 2022. Thus, Figure 1 below compares the distributions of student time spent on Moodle using density plots. It is clear that in 2021 there was a relatively high number of students who spent zero hours on Moodle compared to 2022. The two distributions have similar characteristics of long tails. This characteristic suggests similarities between the number of students who spent a large (outlier) amount of time on Moodle.

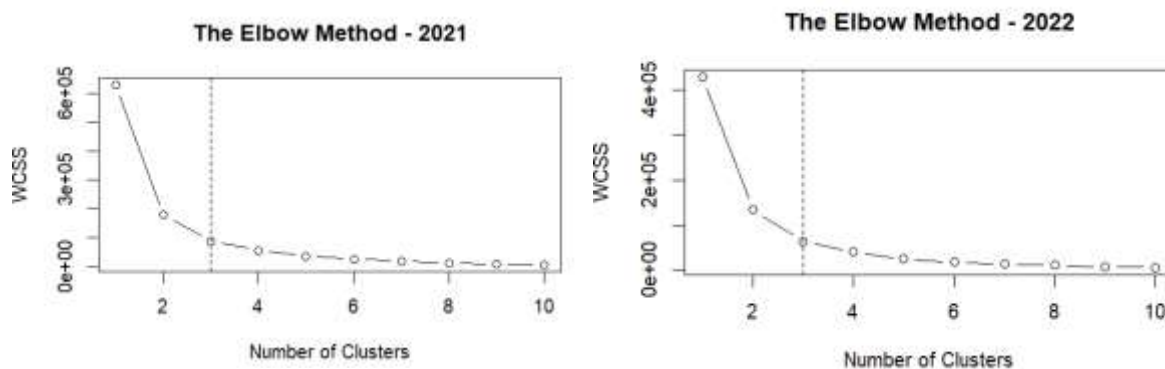


Figure 1: Number of distinct student engagement behaviour groups

To measure the student's levels of engagement, the K-means clustering algorithm with the Elbow method of determining the number of optimal clusters was used. From Figure 2 and Figure 3, 2021 and 2022, respectively, the findings of this paper reviewed that both years have three optimal numbers of clusters or distinct student engagement behaviour. These results suggest that student levels of engagement may not have radically changed between the two years, despite 2021, which had a higher level of disruption due to the pandemic and a higher alert level compared to 2022, with no alert pandemic levels in South Africa. The current paper sought to answer the question, "Is there any significant difference in the frequency of student and staff Moodle login and participation between 2021 and 2022?" Thus, in order to answer the foregoing question, the following hypotheses were formulated,

Table 1: Analysis Results

| | Student | | Staff | |
|--------------------------|---------|---------|---------|---------|
| | 2021 | 2022 | 2021 | 2022 |
| Mean | 9.5449 | 16.2921 | 32.5553 | 13.7472 |
| Std | 17.4521 | 15.4923 | 44.8157 | 18.1481 |
| Mean diff | 6.7422 | | 18.8125 | |
| Degree of freedom | 1729 | | 40 | |
| t | -12.02 | | 2.4914 | |
| p-value | 2.2e-16 | | 0.0159 | |

Descriptive analysis

Standard deviation measures the amount of variability or spread of a set of data. In this case, there are two standard deviations for the amount of time spent online by students in 2021 and 2022.

The standard deviation of 17.452 for 2021 suggests that the data points are more spread out or varied from the mean, indicating that some students spent significantly more or less time online than the average. On the other hand, the standard deviation of 15.4923 for 2022 suggests that the data points are less spread out, with fewer students deviating significantly from the mean. Overall, these standard deviations suggest that there may be a difference in the amount of time students spent online in 2021 and 2022, with the latter year showing less variability in the data. However, further analysis would be needed to determine the significance of this difference. In the case of academic staff members, the standard deviation for staff in 2021 is 44.8157 and in 2022 it is 18.1481. This means that the amount of time spent online by staff in 2021 was more varied and diverse than in 2022. In other words, staff members in 2021 had a wider range of online activity, from spending very little time to spending a lot of time online, while in 2022 their online activity was more consistent, with fewer outliers or extreme values.

Student Level Analysis

To explore if there was a difference in student levels of engagement on Moodle between 2021 and 2022, the proceeding hypothesis was tested that is, "there is no statistically significant difference between 2021 and 2022 in student engagement on Moodle". A t-test was conducted to determine if there was a significant difference in the mean engagement of students on Moodle between the years 2021 and 2021. The sample consisted of 1730 observations from 2021 and 1730 observations from 2022. The mean student engagement score in 2021 was 9.54 hours on Moodle, with a standard deviation of 17.45 hours, and the mean student engagement score in 2022 was 16.29 hours, with a standard deviation of 15.49 hours. The t-value for this analysis was calculated to be -12.02, with a p-value of 2.2e-16 and 1729 degrees of freedom. These results indicate a statistically significant difference in the mean student engagement of students on Moodle between the years 2021 and 2022, with a mean increase of 6.74 hours ($t(1729) = -12.02, p = 2.2e-16$). These results suggest that student engagement on Moodle improved between 2021 and 2022. The p-value is small, indicating that the probability of observing the difference of 6.74 by chance is very low, making it highly unlikely that the observed difference is due to chance.

Staff Level Analysis

To test the difference in staff level of engagement a null hypothesis was formulated, that is “there is no statistically significant difference between 2021 and 2022 in staff engagement on Moodle.” For the staff level of analysis, a t-test was conducted to determine if there was a significant difference in the average engagement of academic staff on Moodle between 2021 and 2022. The sample consisted of 41 academic staff in 2021 and the same academic staff in 2022. The average time staff engagement score in 2021 was 32.56 hours on Moodle, with a standard deviation of 44.82 hours, and the mean staff engagement score in 2022 was 13.74 hours, with a standard deviation of 18.15 hours. The t-value for this analysis was calculated to be 2.4914, with a p-value of 0.0159 and 40 degrees of freedom. These results indicate a statistically significant difference in the average time staff engagement on Moodle between 2021 and 2022, with an average time decrease of 18.81 hours ($t(40) = 2.4914, p = 0.0159$). These results suggest that staff engagement on Moodle dropped in 2022. The p-value is smaller than 0.05 thus, the researchers concluded that the probability of observing the difference of 18.81 by chance is very low, making it highly unlikely that the observed difference is due to chance.

DISCUSSION

The results of this study demonstrate a statistically significant disparity in the average level of engagement among students on Moodle between 2021 and 2022, with a mean increase of 6.74 hours. These findings indicate an enhancement in student engagement on Moodle between the aforementioned years. The t-value of -9.8548 and the p-value of $2.2e-16$ suggest that the likelihood of observing a difference of 6.74 by chance is exceedingly low and improbable. These outcomes corroborate prior research, which has identified that the use of educational technology, including Moodle, can positively influence student engagement within the classroom.¹⁵ Nonetheless, this study diverges from prior research by not only focusing on students but, more specifically, how this engagement changes over time. Importantly, this research traces the evolution of student and staff engagement levels on Moodle as infection rates decline and opportunities for in-person classes become available. Earlier studies emphasise the significance of student engagement in online learning only. Therefore, the results of the current study are significant because they enable scholars and practitioners to monitor the extent to which pandemic-related changes impact online learning. In sum, this study adds to the existing literature by providing valuable insights into the significance of Moodle for enhancing student and staff engagement, particularly during pandemic-induced changes to education.

The study examined the difference in average engagement of academic staff on Moodle between 2021 and 2022. The findings indicate a statistically significant decrease in staff engagement, with 18.81-hour mean reduction in 2022 compared to 2021. The results are based on a sample of 41 academic staff, and the observed difference is unlikely to be due to chance, as suggested by the t-value and p-value. These findings are relevant to understanding the impact of pandemic-related changes on staff engagement with educational technology.

Compared to previous research, which solely focused on the experiences of teachers and academics on the use of online learning, the current study makes a significant contribution to the body of knowledge by highlighting the difference in staff engagement on Moodle.¹⁶ Furthermore, the study found a positive relationship between student and staff engagement levels on Moodle. This finding implies that if teachers/academic staff increase their engagement on online learning platforms, students are likely to be more engaged, which is an important implication for educational practice.

The findings of this study have important implications for educational practice. The observed decrease in staff engagement with Moodle highlights the potential negative impact of pandemic-related

¹⁵ Razzaqul Ahshan, “A Framework of Implementing Strategies for Active Student Engagement in Remote/Online Teaching and Learning during the COVID-19 Pandemic,” *Education Sciences* 11, no. 9 (August 31, 2021): 483, <https://doi.org/10.3390/educsci11090483>.

¹⁶ Lawrence Meda and Areej ElSayary, “Establishing Social, Cognitive and Teacher Presences During Emergency Remote Teaching: Reflections of Certified Online Instructors in the United Arab Emirates,” *Contemporary Educational Technology* 13, no. 4 (July 13, 2021): ep318, <https://doi.org/10.30935/cedtech/11073>; Madeleine-Marie Judd et al., “Learning From the Pandemic: The Impacts of Moving Student-Staff Partnerships Online,” *Student Success* 12, no. 2 (September 28, 2021), <https://doi.org/10.5204/ssj.1774>; Eatedal Alabdulkreem, “Higher Education Institution Faculty Teaching Experience during Quarantine: Challenges and Recommendations,” *International Society for Technology, Education, and Science*, 2021.

changes on staff engagement with educational technology. This is particularly relevant in the current context, where online learning has become more prevalent due to the pandemic. Moreover, the positive relationship between student and staff engagement levels on Moodle indicates that increasing staff engagement with online learning platforms can lead to increased student engagement. This has significant implications for improving the effectiveness of online learning and enhancing student learning outcomes.

RECOMMENDATIONS

The study's findings indicate the need for further research to understand the reasons behind the decrease in staff engagement with Moodle in 2022 compared to 2021. Future studies should investigate potential factors such as increased workload, burnout, or changes in teaching modalities. In addition, longitudinal studies should be conducted to explore the evolution of Moodle's student and staff engagement levels over time, especially as the pandemic situation changes and in-person teaching becomes more widely available. To address this decrease in staff engagement, educational institutions should consider implementing policies and initiatives aimed at increasing staff engagement with online learning platforms. This may include providing professional development opportunities and incentives for staff to engage with these technologies effectively. By focusing on these recommendations, future research can further contribute to the knowledge base on the impact of educational technology on student and staff engagement and the effectiveness of online learning in the context of pandemic-related changes to education.

CONCLUSION

The present study aimed to investigate the impact of the increase in the opportunities for face-to-face classes on the level of student engagement on Moodle. The findings of this study provide valuable insights into the impact of pandemic-induced changes on student and staff engagement levels on Moodle. The observed increase in student engagement on Moodle between 2021 and 2022 confirms the positive influence of educational technology on student engagement, as identified in previous research. However, the decrease in staff engagement with Moodle in 2022 compared to 2021 suggests a potential negative impact of pandemic-related changes on staff engagement with online learning platforms. To address this problem, educational institutions should consider implementing policies and initiatives aimed at increasing staff engagement with online learning technologies.

BIBLIOGRAPHY

- Ahshan, Razzaqul. "A Framework of Implementing Strategies for Active Student Engagement in Remote/Online Teaching and Learning during the COVID-19 Pandemic." *Education Sciences* 11, no. 9 (August 31, 2021): 483. <https://doi.org/10.3390/educsci11090483>.
- Alabdulkreem, Eatedal. "Higher Education Institution Faculty Teaching Experience during Quarantine: Challenges and Recommendations." *International Society for Technology, Education, and Science*, 2021.
- Alturki, Uthman, and Ahmed Aldraiweesh. "Application of Learning Management System (LMS) during the COVID-19 Pandemic: A Sustainable Acceptance Model of the Expansion Technology Approach." *Sustainability* 13, no. 19 (October 3, 2021): 10991. <https://doi.org/10.3390/su131910991>.
- Asfour, Omar S., and Amer M. Alkharoubi. "Challenges and Opportunities in Online Education in Architecture: Lessons Learned for Post-Pandemic Education." *Ain Shams Engineering Journal* 14, no. 9 (September 2023): 102131. <https://doi.org/10.1016/j.asej.2023.102131>.
- Dascalu, Maria-Dorinela, Stefan Ruseti, Mihai Dascalu, Danielle S. McNamara, Mihai Carabas, Traian Rebedea, and Stefan Trausan-Matu. "Before and during COVID-19: A Cohesion Network Analysis of Students' Online Participation in Moodle Courses." *Computers in Human Behavior* 121 (August 2021): 106780. <https://doi.org/10.1016/j.chb.2021.106780>.
- Deliwe, Ayanda Pamella. "The Use of Learner Management System (MOODLE) in Promoting Teaching and Learning." *Universal Journal of Educational Research* 8, no. 12B (December 2020): 8383–92. <https://doi.org/10.13189/ujer.2020.082644>.

- Dobashi, Konomu, Curtis P. Ho, Catherine P. Fulford, Meng-Fen Grace Lin, and Christina Higa. "Learning Pattern Classification Using Moodle Logs and the Visualization of Browsing Processes by Time-Series Cross-Section." *Computers and Education: Artificial Intelligence* 3 (2022): 100105. <https://doi.org/10.1016/j.caeai.2022.100105>.
- Juan, Samantha. "Promoting Engagement of Nursing Students in Online Learning: Use of the Student-Generated Question in a Nursing Leadership Course." *Nurse Education Today* 97 (February 2021): 104710. <https://doi.org/10.1016/j.nedt.2020.104710>.
- Judd, Madeleine-Marie, Franciele Spinelli, Brooke Szucs, Naima Crisp, Julia Groening, Christy Collis, Beata Batorowicz, Dino Willox, and Anna Richards. "Learning From the Pandemic: The Impacts of Moving Student-Staff Partnerships Online." *Student Success* 12, no. 2 (September 28, 2021). <https://doi.org/10.5204/ssj.1774>.
- Kerimbayev, Nurassyl, Nurdaulet Nurym, Aliya Akramova, and Saule Abdykarimova. "Virtual Educational Environment: Interactive Communication Using LMS Moodle." *Education and Information Technologies* 25, no. 3 (May 1, 2020): 1965–82. <https://doi.org/10.1007/s10639-019-10067-5>.
- Meda, Lawrence, and Areej ElSayary. "Establishing Social, Cognitive and Teacher Presences During Emergency Remote Teaching: Reflections of Certified Online Instructors in the United Arab Emirates." *Contemporary Educational Technology* 13, no. 4 (July 13, 2021): ep318. <https://doi.org/10.30935/cedtech/11073>.
- Ohei, Kenneth Nwanua, and Roelien Brink. "Web 3.0 and Web 2.0 Technologies in Higher Educational Institute: Methodological Concept towards a Framework Development for Adoption." *International Journal for Infonomics* 12, no. 1 (March 30, 2019): 1841–53. <https://doi.org/10.20533/iji.1742.4712.2019.0188>.
- Parida, Subhadarsini, Subas P. Dhakal, Kantha Dayaram, Hossein Mohammadi, Desmond Tutu Ayentimi, Albert Amankwaa, and Denise D'Cruz. "Rhetoric and Realities in Australian Universities of Student Engagement in Online Learning: Implications for a Post-Pandemic Era." *The International Journal of Management Education* 21, no. 2 (July 2023): 100795. <https://doi.org/10.1016/j.ijme.2023.100795>.
- Saleem, Naifa E., Mohammed N. Al-Saqri, and Salwa E.A. Ahmad. "Acceptance of Moodle as a Teaching/Learning Tool by the Faculty of the Department of Information Studies at Sultan Qaboos University, Oman Based on UTAUT." *International Journal of Knowledge Content Development & Technology* 6, no. 2 (December 31, 2016): 5–27. <https://doi.org/10.5865/IJKCT.2016.6.2.005>.
- Schank, Christoph, and Jantje Halberstadt. "Teaching Transformative Service Learning." In *Transforming Entrepreneurship Education*, 3–21. Cham: Springer International Publishing, 2023. https://doi.org/10.1007/978-3-031-11578-3_1.
- Syarif, Irman, Muhammad Junaedi Mahyuddin, Handayani Sura', and Elihami Elihami Baharuddin. "Using Moodle Learning Management System in Teaching from Distance Learning to the E-Learning 5.0 of New Technology." *Journal of Physics: Conference Series* 1933, no. 1 (June 1, 2021): 012124. <https://doi.org/10.1088/1742-6596/1933/1/012124>.
- Tachie, Simon Adjei. "Meta-Cognitive Skills and Strategies Application: How This Helps Learners in Mathematics Problem-Solving." *EURASIA Journal of Mathematics, Science and Technology Education* 15, no. 5 (March 5, 2019). <https://doi.org/10.29333/ejmste/105364>.
- Zen, Zelhendri, Reflianto, Syamsuar, and Farida Ariani. "Academic Achievement: The Effect of Project-Based Online Learning Method and Student Engagement." *Heliyon* 8, no. 11 (November 2022): e11509. <https://doi.org/10.1016/j.heliyon.2022.e11509>.

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