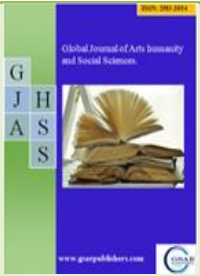
	<b>Global Journal of Arts Humanity and Social Sciences</b>			
	ISSN: 2583-2034			
	Abbreviated key title: Glob.J.Arts.Humanit.Soc.Sci			
	Frequency: Monthly			
Published By GSAR Publishers				
Journal Homepage Link: <a href="https://gsarpublishers.com/journal-gjahss-home/">https://gsarpublishers.com/journal-gjahss-home/</a>				
Volume - 4	Issue - 12	Dec 2024	Total pages 1363-1374	

## Page Views in Learning Management System (LMS) as Determinant in Passing the Board Exam

By

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### Abstract

This study investigated the correlation between student engagement in Learning Management Systems (LMS) and success in professional board exams, focusing on board passers and non-passers from Centro Escolar University (CEU). Using metrics such as overall course grades, assignment submission on time, participation, and number of page views within the university's LMS CEU-LEAPS. The study aimed at identifying engagement trends that contribute to academic success. While timely submission and participation rates were comparable between the two groups, board passers exhibited significantly higher engagement with course materials, as reflected by a greater number of page views, suggesting that the deeper interaction with course content, rather than merely meeting deadlines, ensures board exam success.

**Index Terms:** Learning Management Systems (LMS), student engagement, academic engagement, board exam performance, Canvas, higher education

### Article History

Received: 21- 12- 2024  
Accepted: 28- 12- 2024  
Published: 31- 12- 2024

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## INTRODUCTION

A Learning Management System (LMS) is a software application or web-based technology wherein preprogrammed instructions manage and control the learning processes. It provides a virtual environment for learning that can be accessed by learners and teachers anytime and anywhere. It serves as a digital hub that offers various platforms for teachers to create courses, control student access, publish assignments, monitor students' progress, and more. For teachers and students, a well-thought-out LMS transforms the educational process. Many educational procedures can be streamlined resulting in a significant benefit for both teachers and learners. The collaborative learning environments and student-tailored feedback allow them to access the different course materials whenever and wherever allowing them to study at their own pace and choose flexible learning paths to the on-demand access to resources.

Over the past decade, the Learning Management System (LMS) market has experienced significant growth, with a compound annual growth rate (CAGR) of 18.4%. In 2022, the market generated revenues of \$16.1 billion, marking the beginning of a substantial upward trajectory. This trend continued into 2023, with revenues rising to \$18.5 billion, and further to \$20.9 billion in 2024. By 2025, the market had surpassed the \$24.8 billion

milestone, emphasizing its critical role in modern education and training. Looking ahead, the LMS market is expected to maintain its high growth momentum, with projections indicating revenues of \$28.9 billion in 2026, \$32.6 billion in 2027, and \$35.6 billion in 2028. By 2029, revenues are anticipated to reach \$40.9 billion, followed by \$46.1 billion in 2030, \$53.0 billion in 2031, and an impressive \$61.8 billion by 2032. This exponential growth underscores the increasing adoption of LMS platforms by educational institutions and businesses, highlighting their essential role in shaping the future of learning and training [31].

In the Philippines, LMS platforms are being utilized to expand accessibility, provide entirely online learning experiences, and supplement traditional instruction in a variety of educational settings, from elementary schools to universities and professional development programs. These platforms are being used by schools to develop interactive lesson plans, administer tests, and promote parent-teacher and student communication. It assists distance learning, blended learning approaches, and research initiatives in higher education. For teachers and administrators, it simplifies work, lessens the need for paper-based procedures, and fosters communication with one another.

Centro Escolar University utilizes the Canvas LMS by Instructure and coined it as CEU-LEAPS. An acronym for CEU Learning



Engagement and Proficiency System, to emphasize its purpose. The LEAPS provides its learners and teachers with a centralized, user-friendly learning environment where students access course materials, turn in assignments, get fast feedback, and track their scores and progress. It gives the teachers the ability to create interactive lesson plans, incorporate multimedia materials, and provide students with individualized help as they answer quizzes and engage in activities. The recent updates made by Instructure the LEAPS included enhanced mobile functionality, improved analytics, and new collaboration tools, to provide a more seamless and interactive learning experience. Within it are data-driven insights derived from various logs based on students' activities. This gives teachers perspectives on student engagement trends [2] thereby adjusting learning variables where applicable.

However, there is more than just understanding student involvement and choosing learning platforms. CEU is one of the producers of board passers, this study looks at the engagement patterns among Medical Technology to provide insights into how student engagement in their LEAPS relates to board exam performance. The researchers looked into the engagement patterns of passers and non-passers in terms of their course grades, submission of assignments on time, overall participation in their courses, and number of page views derived from the student log. Hopefully, these patterns can be used as early indicators to identify whether students will pass or fail the board exam.

## HYPOTHESIS

Null Hypothesis ( $H_0$ ):

There is no significant relationship between the engagement patterns of passers and non-passers in terms of overall course grade, submission of assignments on time, overall participation in their courses, and number of page views.

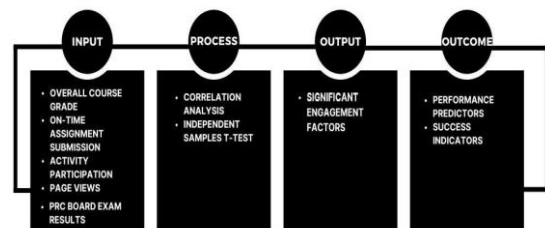
Alternative Hypothesis ( $H_1$ ):

There is a significant relationship between the engagement patterns of passers and non-passers in terms of overall course grade, submission of assignments on time, overall participation in their courses, and number of page views.

## STATEMENT OF THE PROBLEM

1. What are the engagement patterns of students who successfully pass or fail the board exam in terms of overall course grade, submission of assignments on time, overall participation in their courses, and number of page views?
2. Is there a significant relationship between the engagement patterns of passers and non-passers in terms of overall course grade, submission of assignments on time, overall participation in their courses, and number of page views?
3. Can LMS engagement patterns and features be used as early indicators to identify whether students will pass or fail the board exam?

## CONCEPTUAL FRAMEWORK



This framework, structured into four interconnected components, examined the relationship between students' engagement in CEU-LEAPS and their performance on board exams. The first component, LEAPS Engagement Metrics, includes four key indicators of student engagement: overall course grades, assignment submission patterns, activity participation levels, and frequency of page views. These metrics serve as independent variables that may influence board exam outcomes. The second component focuses on Statistical Analysis, utilizing correlation analysis to explore relationships between variables and an independent samples t-test to compare engagement metrics between students who pass the board exam and those who do not. The third component, Board Exam Performance, involves the actual PRC Board Exam results, categorizing students as either passers or non-passers and functions as the dependent variable against which all engagement metrics are evaluated. Finally, the Determinant Factors component represents the anticipated outcomes of the analysis, highlighting significant engagement factors, performance predictors, and success indicators identified through statistical analysis.

## REVIEW OF THE RELATED LITERATURE AND STUDIES

A Learning Management System (LMS) is a software application used in higher learning institutions (HLIs) to support both teaching and learning via the Internet [27]. LMS platforms are mainly used for formal and informal learning, often overlooking non-formal learning [28]. They facilitate online learning and act as repositories for instructional resources [37][28]. LMS enriches the learning experience, promotes student dedication to academic content like sustainability education, and enhances resource accessibility and peer interaction [4]. The ease of navigation in LMS platforms significantly impacts students' perceived ease of use, a critical factor for effective learning [7].

Student engagement in LMS is a psychological state of being motivated and absorbed in the learning process, distinct from disengagement. It encompasses affective, behavioral, and cognitive dimensions, positively correlating with academic performance [17] [5]. Emotional and agentic engagement strongly influence student outcomes. Internal factors like flourishing and locus of control, and external factors like teacher autonomy support and technology use, predict student engagement. Both students and teachers increasingly rely on LMS for monitoring and participation,

essential for achieving learning outcomes. Lack of participation can lead to academic difficulties and dropouts [5]. LMS design features and student trust significantly affect performance [7]. Instructor confidence in using LMS tools is crucial for successful LMS integration in HLIs [27]. However, challenges such as participation limitations and disengagement due to LMS feature constraints exist [1].

LMS platforms track learning behaviors via "navigation records," helping instructors evaluate progress (Avcı & Ergün, 2019). Their success depends on integrating formal, informal, and non-formal learning features. Open-source platforms like Moodle are customizable, while cloud-based systems like Canvas have higher costs [28]. To boost engagement, LMS should include multimedia, interactive quizzes, and collaborative tools. High-quality instruction and study habits, supported by LMS tools, enhance student performance in board exams, particularly in the Philippines [22][19]. Poor LMS design, complicated interfaces, and ineffective teaching methods can hinder engagement and performance [1][39]. LMS use correlates with improved academic performance and positive attitudes toward learning [6]. Educators drive initial LMS engagement, with distinct learning patterns emerging as students interact more with the system [21]. LMS tools are essential for course delivery and communication, though their pedagogical effectiveness needs improvement [1].

**METHODOLOGY**

This study employed a correlational research design using descriptive and inferential statistics to find if there is a relationship between students' LEAPS engagement and their performance in board exams. The research utilized both primary and secondary data sources. It included engagement records using the following metrics such as overall course grade, on-time submission of the assignment, participation in the activities, and the number of page views. These logs were correlated in their board exam records published on the Professional Regulatory Commission (PRC) official website for the academic year 2022. All data were anonymized. An independent samples t-test compares the passers and non-board passers to determine if there is a statistically significant difference in collected data on overall grades, assignment submission frequency, page views, and participation, along with their board exam performance.

**Table 1.1**

Overall Course Grade of Board Passers and Non-board Passers in their Professional Courses

Courses	Board Passers Average	Non-board Passer Average
Clinical Bacteriology	80.91	79.98
Clinical Bacteriology (Lab)	81.61	79.44
Hematology 1	76.34	72.06
Hematology 1 (Lab)	86.39	85.96

Clinical Chemistry 1	77.83	78.48
Clinical Chemistry 1 (Lab)	80.81	78.48
Clinical Chemistry 2	77.45	75.47
Clinical Chemistry 2 (Lab)	81.99	78.73
Hematology 2	79.84	77.77
Hematology 2 (Lab)	73.86	71.83
Histopathologic and Cytologic Techniques	73.86	77.97
Histopathologic and Cytologic Techniques (Lab)	82.10	79.97
Immunohematology	79.52	75.37
Immunohematology (lab)	83.40	79.96
Immunology and Serology	83.54	80.66
Immunology and Serology (lab)	87.25	85.15
Interprofessional Education and Practice	86.16	83.50
Laboratory Management	88.62	85.14
Medical Technology Assessment Program 1	73.85	68.71
Medical Technology Assessment Program 2	80.86	75.71
Mycology and Virology	78.26	76.99
Special Topics in Medical Technology 1	87.68	85.21
Special Topics in Medical Technology 2	89.01	86.73
Undergraduate Research 1	87.25	85.92
Undergraduate Research 1 (lab)	94.53	95.79
Undergraduate Research 2	93.11	92.06
Undergraduate Research 2 (lab)	96.09	94.71
Overall Average Number of Page Views	83.04	80.84

Table 1.1 highlights the differences in average grades between Board Passers and Non-board Passers across various professional courses in a medical technology curriculum. The board passers consistently achieve higher averages, particularly in courses like Laboratory Management (88.62 for passers vs. 85.14 for non-passers) and Special Topics in Medical Technology 2 (89.01 for



passers vs. 86.73 for non-passers). This trend is also evident in laboratory courses, where board passers generally excel. They outperform non-board passers in Immunohematology (Lab) with an average of 83.40 compared to 79.96, and in Immunology and Serology (Lab) with 87.25 versus 85.15. This highlights the value of practical experience for them. Hands-on practice helps students better understand complex concepts and retain information more effectively, emphasizing the necessity of integrating more laboratory-based learning into the curriculum. It significantly enhances student learning in medical laboratory science programs. [34]. Strong practical skills are crucial for success in nursing education, which likely applies to medical technology as well [25]. Practical training not only improves competence but also boosts student confidence, preparing them better for real-world scenarios. However, non-board passers show a slight edge in a few theoretical courses, such as Histopathologic and Cytologic Techniques (77.97 vs.73.86). This advantage also appears in Undergraduate Research 1 (Lab), where non-board passers score marginally higher at 95.79 compared to board passers' 94.53. Research-focused courses generally reflect strong performance for both groups, with non-board passers occasionally matching or surpassing board passers, particularly in lab assessments. The overall average for board passers stands at 83.04, slightly above the 80.84 for non-board passers, indicating a general academic advantage among board passers. This comparison suggests that stronger academic performance in professional and laboratory courses may correlate with success on board exams, though non-board passers also show competitive results, especially in research areas. This discrepancy suggests that non-board passers may have found laboratory work more accessible or engaging than lecture-based learning, highlighting a potential area of academic imbalance. Practical, hands-on learning experiences are more accessible and engaging for students compared to traditional lecture-based learning [16].

**Table 1.2**

Number of On-Time Submission of Assignments in Professional Courses of Board Passers and Non-board Passers

Courses	Board Passers Average	Non-board Passer Average
Clinical Bacteriology	2.09	4.19
Clinical Bacteriology (Lab)	0.64	0.00
Hematology 1	2.23	6.06
Hematology 1 (Lab)	14.36	20.76
Clinical Chemistry 1	34.12	29.05
Clinical Chemistry 1 (Lab)	20.54	20.86
Clinical Chemistry 2	77.09	50.00
Clinical Chemistry 2 (Lab)	50.63	100.00
Hematology 2	73.18	62.12

Hematology 2 (Lab)	69.82	73.20
Histopathologic and Cytologic Techniques	58.74	69.23
Histopathologic and Cytologic Techniques (Lab)	61.24	44.89
Immunohematology	11.55	16.67
Immunohematology (lab)	50.41	50.44
Immunology and Serology	63.13	72.73
Immunology and Serology (lab)	44.69	57.42
Interprofessional Education and Practice	81.58	79.84
Laboratory Management	22.38	20.00
Medical Technology Assessment Program 1	60.80	70.66
Medical Technology Assessment Program 2	79.58	81.13
Mycology and Virology	70.00	84.02
Special Topics in Medical Technology 1	71.46	73.48
Special Topics in Medical Technology 2	59.09	56.25
Undergraduate Research 1	41.05	38.81
Undergraduate Research 1 (lab)	2.04	10.71
Undergraduate Research 2	67.84	76.92
Undergraduate Research 2 (lab)	36.36	55.56
Average Number of Submissions of Assignments on Time	45.43	49.07

Table 1.2 compares on-time assignment submission averages between board passers and non-board passers across various professional courses in their medical technology curriculum. The data reveals that non-board passers generally submit assignments on time more frequently in select courses, such as *Clinical Bacteriology*, *Hematology 1*, *Histopathologic and Cytologic Techniques*, and *Mycology and Virology*. In lab-based courses, non-board passers often demonstrate higher submission rates, as seen in *Clinical Chemistry 2 (Lab)*, where non-board passers



achieve 100% on-time submissions compared to 50.63% among board passers. Interestingly, the overall average of on-time submissions is marginally higher for non-board passers (49.07) than board passers (45.43), suggesting that non-board passers maintain slightly greater consistency across courses in meeting assignment deadlines. Specific courses, like *Clinical Chemistry 2*, also exhibit notable gaps in submission rates between the two groups, possibly indicating variations in engagement or time management skills. These insights may be valuable for designing support strategies to encourage timely submissions, especially for board passers, which could, in turn, contribute to better board exam outcomes.

Course Difficulty, workload, and personal circumstances can affect students' ability to meet deadlines and stay engaged [41]. A need for a deeper understanding of the challenges students face in submitting assignments on time and the development of strategies to address this issue is important [26]. One of which is the relationship between assignment deadlines and student procrastination [33].

**Table 1.3**

Number of Participation in the Activities in Professional Courses of Board Passers and Non-board Passers

Courses	Board Passers Average	Non-board Passer Average
Clinical Bacteriology	46.78	44.88
Clinical Bacteriology (Lab)	30.92	27.51
Hematology 1	36.82	37.20
Hematology 1 (Lab)	24.31	25.01
Clinical Chemistry 1	50.36	50.33
Clinical Chemistry 1 (Lab)	19.12	18.18
Clinical Chemistry 2	57.63	61.50
Clinical Chemistry 2 (Lab)	20.99	20.43
Hematology 2	17.17	17.33
Hematology 2 (Lab)	20.95	20.51
Histopathologic and Cytologic Techniques	44.23	42.34
Histopathologic and Cytologic Techniques (Lab)	26.64	26.60
Immunohematology	36.13	35.95
Immunohematology (lab)	26.25	25.96
Immunology and Serology	46.58	47.58
Immunology and Serology	14.55	14.41

(lab)		
Interprofessional Education and Practice	10.37	9.96
Laboratory Management	18.45	17.78
Medical Technology Assessment Program 1	48.70	48.16
Medical Technology Assessment Program 2	36.19	35.97
Mycology and Virology	17.16	15.02
Special Topics in Medical Technology 1	19.47	18.60
Special Topics in Medical Technology 2	9.30	9.61
Undergraduate Research 1	53.03	54.16
Undergraduate Research 1 (lab)	10.20	6.88
Undergraduate Research 2	10.40	10.62
Undergraduate Research 2 (lab)	4.46	4.09
Average Number Participation	28.04	27.65

Research indicates that active student participation in classroom activities positively impacts learning outcomes in higher education. Classroom participation is significantly correlated with improved knowledge acquisition, ability enhancement, and quality development (Di Yao et al., 2024). Table 1.3 details the average number of participation in activities among Board Passers across professional courses in a medical technology program. The overall average participation across courses is slightly higher for the first column of averages (28.04) compared to the second (27.65), indicating fairly consistent engagement levels. Higher participation averages are observed in courses like Clinical Chemistry 2 (57.63 in the first column and 61.50 in the second), Undergraduate Research 1 (53.03 and 54.16), and Medical Technology Assessment Program 1 (48.70 and 48.16). These figures suggest a strong involvement in hands-on or research-oriented courses, which may support skill development and practical knowledge.

Some courses, such as Clinical Bacteriology (46.78 and 44.88) and Immunology and Serology (46.58 and 47.58), show consistently high participation rates, reflecting the commitment to theoretical and applied learning in microbiology and immunology. Laboratory courses generally exhibit lower participation averages, as seen in Clinical Chemistry 1 (Lab) (19.12 and 18.18) and Hematology 2 (Lab) (20.95 and 20.51), potentially indicating more structured or fewer participatory activities compared to lecture-based courses. Certain areas like Interprofessional Education and Practice and

Special Topics in Medical Technology 2 reflect relatively low engagement (below 10.50 on average), which could be due to limited activity frequency or different course structures. The data shows that Board Passers generally maintain steady participation across most courses, with higher engagement in research, assessment programs, and applied sciences, supporting a comprehensive learning experience that likely aids in board exam readiness.

Engaging students through discussions, group work, and presentations can enrich the learning environment and promote democratic education [3]. Interactive methods like board games in accounting courses lead to more favorable perceptions of the subject and increased learning effectiveness [8] [30]. Similarly, classroom experiments in economics classes enhance student attendance and learning achievement, with weaker students benefiting the most [23]. Instructors play a crucial role in facilitating student participation, which can vary based on course content and student interest [3]. However, the level of participation and engagement can vary significantly between theoretical and practical components. This indicates the need for tailored approaches to ensure balanced engagement in all areas of the curriculum.

**Table 1.4**

Number of Page Views in their Professional Courses of Board Passers and Non-board Passers

Courses	Average Number of Participation/s	Average Number of Participati on/s
Clinical Bacteriology	1047.27	902.62
Clinical Bacteriology (Lab)	1005.18	832.85
Hematology 1	931.45	818.08
Hematology 1 (Lab)	669.53	536.80
Clinical Chemistry 1	609.70	566.72
Clinical Chemistry 1 (Lab)	484.28	376.75
Clinical Chemistry 2	420.35	401.06
Clinical Chemistry 2 (Lab)	445.75	344.89
Hematology 2	260.22	218.78
Hematology 2 (Lab)	332.04	284.30
Histopathologic and Cytologic Techniques	617.51	522.20
Histopathologic and Cytologic Techniques (Lab)	376.21	332.59
Immunohematology	814.36	751.18
Immunohematology (lab)	662.61	543.53

Immunology and Serology	573.61	476.20
Immunology and Serology (lab)	224.78	190.96
Interprofessional Education and Practice	325.70	253.06
Laboratory Management	305.56	266.37
Medical Technology Assessment Program 1	747.00	586.27
Medical Technology Assessment Program 2	525.90	416.90
Mycology and Virology	322.16	243.66
Special Topics in Medical Technology 1	320.29	284.85
Special Topics in Medical Technology 2	299.19	260.01
Undergraduate Research 1	1374.71	1190.67
Undergraduate Research 1 (lab)	176.16	109.46
Undergraduate Research 2	127.77	118.88
Undergraduate Research 2 (lab)	82.77	78.72
Overall Average Number of Page Views	521.56	441.05

Table 1.4 presents the average number of page views for Board Passers across various professional courses in a medical technology curriculum, highlighting differences in digital engagement or course material access. The **overall average number of page views** is 521.56 for the first group and 441.05 for the second, suggesting a moderate increase in page engagement for the first group. Courses with the highest page views include **Clinical Bacteriology** (1047.27 and 902.62), **Undergraduate Research 1** (1374.71 and 1190.67), and **Medical Technology Assessment Program 1** (747.00 and 586.27), indicating strong interest or need for frequent reference in these subjects, possibly due to complex content or preparation for assessments.

Laboratory courses generally exhibit fewer page views than their lecture counterparts. For instance, **Clinical Chemistry 1** has 609.70- and 566.72-page views on average, while its lab component records lower engagement at 484.28 and 376.75. This trend may reflect more practical, hands-on work in labs, reducing the necessity for extensive page views. Additionally, the data reveals lower page engagement in research-focused courses towards the end of the program, such as **Undergraduate Research 2** (127.77 and 118.88) and **Undergraduate Research 2 (Lab)** (82.77 and 78.72), perhaps due to more specialized or intensive project work requiring less frequent content review.

Board Passers show relatively high engagement across theoretical courses, especially in **Histopathologic and Cytologic Techniques** and **Immunoematology**, indicating a potentially strong reliance on course materials in areas requiring conceptual understanding. The general trend shows that Board Passers are active in accessing course materials, with particularly high page views in content-heavy and assessment-driven courses, likely aiding in thorough preparation for board exams. This corresponds that high engagement in certain courses may reflect the perceived complexity or importance of the content, prompting students to invest more effort in those areas [24]. Lower engagement levels in some courses might indicate the need for better instructional strategies or curricular improvements to capture student interest and enhance their involvement [9][15]. Other courses like Hematology 2 (260.22) and its lab (332.04) also fall on the lower end of the engagement spectrum, suggesting potential areas for curricular improvement or enhanced instructional strategies to

boost student involvement. This high engagement may reflect the perceived difficulty or importance of this subject. Effective laboratory experiences significantly contribute to students' understanding of complex scientific concepts and their ability to apply theoretical knowledge in practical settings. This aligns with the observed high page views, reflecting the importance students place on thoroughly understanding these materials. A well-designed laboratory experiences can bridge the gap between theory and practice, enhancing overall learning outcomes [32]. This supports the need for a more integrated approach in delivering research-related courses to balance theoretical and practical engagement. Fostering better student interaction and comprehension in less engaging courses can be achieved through innovative teaching strategies and more interactive content delivery [35]. This suggests that revisiting the instructional design and providing additional resources or support in these courses could help improve student engagement and learning outcomes.

**Table 4.1**  
Analysis of Grade Averages Between Board Passers and Non-board Passers

Measure	Group	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	Hypothesis Conclusion
Grade	Board Passers	6.23	.013	.49	195.00	0.623	0.72	1.46	-2.15 to 3.59	H0 Accepted, Not Significant
	Non-board Passers			.63	174.79	.528	0.72	1.14	-1.52 to 2.96	

Table 4.1 presents the results of Levene's Test for Equality of Variance and a T-Test for Equality of Means, which assess whether the grade averages of Board Passers and Non-board Passers significantly differ. The F-value is 6.23 with a significance level (p-value) of .013, indicating that there is a significant difference in variances between Board Passers and Non-board Passers. A p-value below the .05 threshold suggests that the assumption of equal variances is violated, so the T-Test results need to be interpreted with this in mind. The T-Test reveals a t-value of .49 with a degree of freedom (df) of 195 and a 2-tailed significance of .623. Since this p-value is greater than .05, it indicates that there is no statistically significant difference in the average grades between Board Passers and Non-board Passers. The mean difference between the two groups is .72, with a standard error of 1.46. The 95% confidence interval of the mean difference

ranges from -2.15 to 3.59, encompassing zero, which further confirms that any observed difference in grades is not statistically significant.

Given the results, the null hypothesis (H0) that there is no significant difference in grades between Board Passers and Non-board Passers is accepted, and the alternative hypothesis (H1) is rejected. Contradictory to the study that high school GPA and college admission tests are significant predictors of academic performance for both groups [11][13] in this case, there is a difference in variance between the two groups, however average grades do not differ significantly between Board Passers and Non-board Passers. Therefore, grade performance alone does not appear to significantly distinguish Board Passers from Non-board Passers in this dataset.

**Table 4.2**  
Analysis of Assignment Submission Timeliness Between Board Passers and Non-board Passers

Measure	Group	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	Hypothesis Conclusion
Submission	Board	2.46	.118	.68	195.00	.494	2.20	3.22	-4.14 to 8.54	H0 Accepted,



of Assignments on Time	Passers									Not Significant
	Non-board Passers		.73	111.20	.470	2.20	3.04	-3.81 to 8.22		

Table 4.2 presents the results of Levene's Test for Equality of Variance and the T-Test for Equality of Means regarding the submission of assignments on time by Board Passers and Non-board Passers. The F-value is 2.46, with a significance level (p-value) of .118. This indicates that the variances between the two groups are not significantly different, as the p-value is above the .05 threshold. This allows the assumption of equal variances to be reasonably applied in the subsequent T-Test. The T-Test shows a t-value of .68, with degrees of freedom (df) of 195. The 2-tailed significance level is .494, which is greater than .05. This result indicates that there is no statistically significant difference in the average submission rates of assignments on time between Board Passers and Non-board Passers. The mean difference between the two groups is 2.20, with a standard error of 3.22. The 95% confidence interval for the mean difference ranges from -4.14 to 8.54, which includes zero. This reinforces the conclusion that any difference in assignment submission rates is not statistically significant.

Based on these results, the null hypothesis (H0) stating that there is no significant difference in the timely submission of assignments between Board Passers and Non-board Passers is accepted. While the alternative hypothesis (H1) is rejected. There is no significant difference in the rates of assignment submissions on time between Board Passers and Non-board Passers. The findings suggest that performance in assignment submission does not distinctly separate these two groups in this dataset, similar to the results found in Table 4.1 regarding grade averages.

Submitting on time is not a factor, student characteristics, institutional support, and exam preparation [12][14] determines whether a student will pass or fail in the board exam. Moreover, financial struggles, family problems, and difficulty comprehending exam questions [10]. Subject-specific strengths and weaknesses were identified in nursing and accountancy exams are the challenges face by non-passers [36] [14].

**Table 4.3**  
Analysis of Participation Rates Between Board Passers and Non-board Passers

Measure	Group	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	Hypothesis Conclusion
Participation	Board Passers	1.54	.216	-0.79	195.00	.429	-0.52	0.66	-1.83 to 0.78	H0 Accepted, Not Significant
	Non-board Passers			-0.96	154.80	.337	-0.52	0.54	-1.60 to 0.55	

Table 4.3 summarizes the results of Levene's Test for Equality of Variance and the T-Test for Equality of Means regarding the participation rates of Board Passers and Non-board Passers. The F-value is 1.54, with a significance level (p-value) of .216. Since this p-value is greater than the .05 threshold, it indicates that the variances between the two groups (Board Passers and Non-board Passers) are not significantly different. Therefore, the assumption of equal variances is satisfied for the T-test analysis. The T-Test yields a t-value of -0.79 with degrees of freedom (df) of 195. The two-tailed significance level is .429, which is significantly higher than .05. This result suggests that there is no statistically significant difference in the average participation rates between Board Passers and Non-board Passers. The mean difference is -0.52, indicating that Board Passers have a slightly lower average participation rate than Non-board Passers, but this difference is not substantial. The standard error of the mean difference is 0.66. The 95% confidence

interval for the mean difference ranges from -1.83 to 0.78, which includes zero, further reinforcing the conclusion of no significant difference.

Studies have shown that various aspects of LMS participation, including frequency and duration of access, discussion board activity, and interaction quality, are significantly associated with student achievement [38][29]. However, based on these findings, the null hypothesis (H0) that asserts no significant difference in participation rates between Board Passers and Non-board Passers is accepted, while the alternative hypothesis (H1) is rejected. It indicated that there is no significant difference in participation rates between Board Passers and Non-board Passers. The results demonstrate that participation does not significantly differentiate between these two groups, similar to the findings presented in Tables 4.1 and 4.2 concerning grade averages and assignment





submission timeliness. This suggests that both groups exhibit comparable engagement levels in terms of participation.

**Table 4.4**  
Analysis of Page Views Between Board Passers and Non-board Passers

Measure	Group	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	Hypothesis Conclusion
Page Views	Board Passers	3.10	.080	2.44	195.00	.016	98.68	40.42	18.97 to 178.39	H1 Accepted, Significant
	Non-board Passers			3.09	170.56	.002	98.68	31.90	35.72 to 161.65	

Table 4.4 presents the results of Levene's Test for Equality of Variance and the T-Test for Equality of Means concerning the page views of Board Passers and Non-board Passers. The F-value is 3.10, with a significance level (p-value) of .080. Although this p-value is slightly above the conventional threshold of .05, it is still relatively close, indicating that the assumption of equal variances could be considered marginally satisfied for the T-test analysis. The T-Test yields a t-value of 2.44 with degrees of freedom (df) of 195. The two-tailed significance level is .016, which is below the .05 threshold. This finding indicates a statistically significant difference in the average page views between Board Passers and Non-board Passers. The mean difference of 98.68 suggests that Board Passers have significantly higher average page views compared to Non-board Passers. The standard error of the mean difference is 40.42, indicating some variability in the means. The 95% confidence interval for the mean difference ranges from 18.97 to 178.39, which does not include zero, confirming the significance of the result.

Based on these findings, the alternative hypothesis (H1), which posits a significant difference in page views between Board Passers and Non-board Passers, is accepted, while the null hypothesis (H0) is rejected. This indicated a significant difference in page views between Board Passers and Non-board Passers, with Board Passers exhibiting higher engagement levels in terms of page views.

Similar to what this study has identified there are researches that identified different dimensions of online participation, such as attention and participation patterns, can potentially serve as early indicators of student performance [38]. Additionally, the quality of student interactions, both in discussion forums and with virtual agents, has been found to correlate with academic outcomes [29]. This contrasts with the findings from previous tables (4.1, 4.2, and 4.3), where no significant differences were observed in grades, submission rates, or participation. The significant engagement indicated by the page views may reflect differences in study habits, resource utilization, or course engagement strategies between the two groups.

**FINDINGS OF THE STUDY**

To identify trends and patterns within the data a descriptive comparison was used, focusing on scores, submission rates, participation rates, and page views in different courses. These served as central indicators of performance and engagement levels for both board passers and non-board passers which was used as the basis of the following findings:

1. Board Passers consistently achieve higher average grades in most courses compared to Non-board Passers. Courses with notable grade advantages include Laboratory Management and Special Topics in Medical Technology 2. This trend indicates that Board Passers generally have a strong academic foundation in both theory and practical skills.
2. Board Passers show higher engagement in laboratory courses through timely submission rates and participation. This is evident in courses like Clinical Chemistry 2 (Lab) and Hematology 1 (Lab), suggesting that practical skill development may contribute to their exam success. Their high engagement in lab activities reflects their dedication to gaining hands-on experience in applied sciences.
3. Across most courses, Board Passers demonstrate steady participation in activities, with an average participation rate near 28.04. Theoretical courses like Clinical Chemistry 2 and Medical Technology Assessment Program 1 show higher-than-average engagement, while some laboratory courses have slightly lower participation rates. This may reflect a structured approach in labs, focusing on fewer but more intensive practical exercises.
4. Board Passers tend to have a high number of page views in courses that are content-heavy or assessment-focused, such as Clinical Bacteriology and Medical Technology Assessment Program 1. Their digital engagement is particularly high in theoretical courses where an in-depth review of materials may be essential for mastery, aiding in board preparation.
5. In research-focused courses, both Board Passers and



Non-board Passers show competitive performance, with Non-board Passers occasionally achieving similar or higher grades, particularly in lab research components like Undergraduate Research 1 (Lab). This suggests that while research skills are crucial, they may not be the sole differentiator in board exam success.

6. On the other hand, Levene's Test for Equality of Variance was conducted to check whether the variances of the two groups were equal. The T-test for equality of means determined if there was a statistically significant difference between them providing a robust framework to support the findings below.
7. The analysis revealed a significant difference in the average number of page views between Board Passers and Non-board Passers, as indicated by the t-test results in Table 4.4 ( $p = 0.016$ ). This suggests that Board Passers tend to engage more with course content online, potentially contributing to their higher performance in assessments.
8. For both grades (Table 4.1) and the timely submission of assignments (Table 4.2), the results were not statistically significant ( $p > 0.05$ ). This indicates that while Board Passers had higher average scores and submission rates, these differences were not substantial enough to be considered statistically meaningful. Therefore, it implies that other factors may influence performance beyond mere submission rates or average grades.
9. The analysis of participation rates (Table 4.3) showed no significant differences between the groups, suggesting that both Board Passers and Non-board Passers engaged similarly in course activities. This indicates that participation alone may not be a strong predictor of success in these professional courses.
10. The cumulative data suggests that Board Passers consistently performed better in terms of engagement (as evidenced by higher page views) but did not show a significant advantage in grades or assignment submissions compared to Non-board Passers. This could indicate that the effectiveness of study strategies, resource utilization, or other qualitative factors may play a more crucial role in their success.

## CONCLUSION

Among the engagement patterns examined, the number of page views was the only factor related to the board exam passers. This factor showed a statistically significant relationship with students passing or not passing the board exam. This result suggests that students' success appears to be in their strong engagement in course materials, as evidenced by their number of page views. Therefore, monitoring page views will help educators identify students that will likely to fail and offer them the necessary support that is directed at improving their level of engagement. The number of Page views is a determinant of passing the board exam. There is no statistically significant relationship found for the other engagement patterns.

Moreover, the comparison between board passers with non-passers reveals the importance of active engagement with course materials for board exam success. Even though the two groups have a similar level of participation in course activities, the page view differs significantly, it seems that participation in activities is not enough. On the contrary, interacting with the course content seems to be much more important for the prediction of board exam success. The analysis of different engagement patterns indicated that overall course grades, timely submitting of assignments, and participation in activities were not significantly different between board passers and non-passers. This means that these factors are important in the performance of the student's overall academics, but these are not necessarily translated to board examination success. The number of page views was the only factor related to the number of board examinations passed, reflecting how important a deep level of engagement with course materials.

## RECOMMENDATIONS

1. Enhance the online learning experience and resources available to Non-board Passers to increase their engagement with course materials.
2. Continuously monitor student engagement metrics, such as assignment submissions and page views, to identify trends and areas needing improvement as the basis for instructional practices and resource allocation.
3. Conduct further research to explore the qualitative aspects influencing academic performance, particularly focusing on student perceptions and experiences as the basis for policy changes and educational strategies.
4. Provide training for instructors on effective teaching strategies, including how to create engaging online content and facilitate active learning in both online and in-person settings.

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