The Analysis of Learning Performance Satisfaction for Physical and Online Learning: A Case Study from Taiwan

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https://doi.org/10.34190/ejel.22.9.3305

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Abstract: Management education, continuously evolving since the 1990s, recognizes the need to develop proficient management professional's adept at strategic decision-making. The present research delves into the effectiveness of a management course for first-year students at a chosen School of Management, underlining its paramount importance in ensuring student retention and bolstering departmental stability. The purpose of this research is to evaluate the effectiveness of traditional physical and online learning methods in a management course for first-year students at a university in Taiwan, focusing on students' satisfaction with their learning performance. The study aims to compare the educational efficacy of these two instructional modes and analyze the variations in student performance and satisfaction. The methodology involved a longitudinal design with data collection from first-year students in 2022 (online learning) and 2023 (physical learning). The research employed pre-test and post-test evaluations, regression analysis, and Importance-Performance Analysis (IPA) to assess the impact of course units on students' learning satisfaction. This study employed regression analysis to determine the influence of enhancing "Management Basis" and "Management Operations" on satisfaction. The results revealed that online learning outperformed physical learning in terms of overall student satisfaction, particularly in understanding "Management Basis" and "Management Operations." However, physical learning demonstrated higher improvements in student scores and satisfaction, particularly in areas requiring detailed explanations and hands-on engagement, such as "Control Tools.". The novelty of this research lies in its comparative approach to evaluating two distinct learning environments during a critical period marked by the COVID-19 pandemic. The findings offer valuable insights into how different teaching modalities impact student satisfaction and learning outcomes, providing guidance for educators to refine instructional strategies to enhance student learning efficacy across different formats. The study underscores the importance of adapting teaching methods to suit the specific demands of online and physical learning environments.

Keywords: Satisfaction, Learning performance, Physical learning, Online learning, Importance-Performance analysis

1. Introduction

In 2022, the COVID-19 pandemic significantly altered the educational landscape in Taiwan, leading to a widespread transition to online teaching methods, a shift that echoed global trends in higher education. This change prompted a widespread transition to online teaching methods in the latter half of 2022, reflecting a broader shift observed in higher education institutions throughout the world as well as in Taiwan. Online education is characterized by a learning environment within a digital platform, eliminating direct interactions between teachers and students (Agrawal and Krishna, 2021). This mode of learning became particularly vital for first-year college students, who had to adapt to the challenges of distance education as they began their higher education journey. According to Danchikov et al. (2021), online learning allows students and teachers to collaborate and interact through the Internet. This method of education depends on platforms that can support teaching and learning activities conducted remotely rather than physical learning.

Given the newness and relative unfamiliarity of the online learning setting, evaluating the effectiveness of students' academic efforts was crucial—the emerging educational environment called for a thorough analysis to understand the students' achievements and progress. Later, as the effects of the COVID-19 outbreak started to lessen, the second semester of 2023 marked a return to traditional face-to-face classroom settings. While initially set in the online mode, the learning approach is now transitioning back to physical education. The move towards physical instruction began from the stated session, following a series of prior online classes.

Cite this article: Chiu, K-C and Chen, R-C. 2024. "The Analysis of Learning Performance Satisfaction for Physical and Online Learning: A Case Study from Taiwan", *Electronic Journal of e-Learning*, 22(9), pp 28-45, https://doi.org/10.34190/ejel.22.9.3305

Physical learning involves a face-to-face educational method where educators and students interact directly within a physical environment (Kundu and Bej, 2021). While internet usage supports many aspects of physical learning—such as accessing resources, submitting assignments, and facilitating communication—the core of physical learning lies in the in-person engagement it offers. Physical learning is viewed as having enhanced effectiveness, increased accessibility, fewer technical difficulties, and a lower likelihood of academic dishonesty and deception compared to its online equivalent. Based on the research by Zhu et al. (2023), noticeable differences in learning outcomes stem from students' motivational attitudes in both online and physical learning environments. The study indicates that students hesitate to participate in online learning, whereas they demonstrate enthusiasm in actively partaking in offline educational tasks.

Learning outcomes are crucial indicators for assessing the effectiveness of educational processes and the achievement of teaching objectives even with varying levels of student engagement, measurable results consistently emerge, reflecting the success of different instructional methods (Trigwell and Prosser, 1991). In research conducted by Singh et al. (2021), noticeable differences were identified in student learning outcomes between physical and online instructional methods. The results highlighted the superior effectiveness of face-to-face education over its online counterpart. Jiao et al. (2022) found that face-to-face learning environments often lead to better educational efficacy, higher productivity, and a more conducive atmosphere for learning compared to online settings.

This research aims to evaluate class course units delivered through online and physical instructional methods. This study explores the differences in learning outcomes between online and physical instructional methods, focusing on data gathered from first-year students in a management course. Utilizing pre-test and post-test evaluations, the study intends to gauge the effect of these teaching modalities on student achievements. The study is based on the systematic collection and comparison of data from a 2022 pre-test on online learning and the physical pedagogies implemented in 2023. The investigative spotlight is cast upon a pivotal foundational course provided by the Department of Business Administration within the School of Management. This principal course constitutes a vital segment of the curriculum for incoming students, integrating fundamental tenets of management theory and its tangible execution.

By analyzing and comparing data from these distinct educational approaches, our study aims to identify key differences and inconsistencies. This thorough examination provides critical insights that can be used to enhance pedagogical methods. Leveraging these insights, educators can refine their instructional strategies to significantly improve student learning outcomes.

1.1 Research Question and Objective

The Research Questions of this research encompass the following:

R1: What is the comparative educational efficacy of traditional physical learning versus online learning environments?

R2: How do learners' achievements in the IPA quadrant differ between traditional and online courses, and how can this inform teaching improvements?

The objectives of this research encompass the following:

O1:Evaluate the level of educational efficacy in both traditional physical and online learning.

O2: Analyze variations in the distribution of learners' educational achievements in the IPA quadrant when comparing traditional and online courses.

2. Literature Review

2.1 Student Self-Assessment

Self-assessment in students is an instructional strategy within the educational realm that encourages learners to gauge their academic advancement and output actively. As a pivotal element of ongoing evaluation, self-assessment accentuates reflective thinking, deepening students' grasp of their learning trajectories and accomplishments (“Self-Reported Learning Outcomes at UMass Amherst”, 2017). Even though students' self-evaluations often reflect perceptions rather than verifiable abilities, higher educational institutions employ these in tandem with objective evaluations to scrutinize student learning. Evidence suggests that students' subjective evaluations sometimes coincide with objective measures. Though not exact replicas, such self-reported metrics aid in understanding student perceptions across diverse learning objectives.

In earlier research, Kikas and Jõgi (2016) explored the creation and utility of two tools meant to measure the learning tactics of middle schools and their potential learning outcomes. Their findings underscored the significance of meticulously selecting assessment techniques for middle school settings. Laine et al. (2019) researched the effects of an entrepreneurship education structured around business plans, probing its repercussions on students' self-assessed learning outcomes concerning entrepreneurial competencies, inclinations, and capabilities. Their investigation discerned four primary self-recognized learning outcomes: pivotal professional competencies, organizational skills, entrepreneurial confidence, and a bias toward growth.

In other research, Ifenthaler, Schumacher, and Kuzilek (2023) leveraged learning analytics to delve into the nexus between students' engagement in self-assessments, their subsequent performance in the final examination, and their self-articulated self-evaluation methods. Their discoveries showed a predominant tendency among students to employ self-assessments ahead of pivotal tests. They also identified two distinct clusters based on the intensity of engagement with self-assessments, with heightened attention resonating positively with superior final exam results.

2.2 Learning Performances

Learning outcomes are essential indicators that define the expected knowledge, skills, and abilities students should acquire after completing an educational activity (Alshammary and Alhalafawy, 2023). These outcomes act as the educational process's roadmap, giving educators and students a clear goal to target. Evaluating these learning outcomes can include many indicators such as satisfaction levels, task performance, self-rated knowledge acquisition, observed achievements, in-class assessments, active involvement, self-belief in learning capacity (self-efficacy), immersion in learning, and the overall educational experience (Oktriani, Hufad, and Utami 2023). Hill et al. (2011) combine various assessment criteria, covering aspects like learning results, self-assessment, achieved outcomes, Satisfaction, in-class evaluations, participation, self-confidence, technological ease, and student predispositions and views, which aligns with our approach to comparing these two modalities.

Furthermore, Pondee, Panjaburee, and Srisawasdi (2021) propose a multi-layered methodology for assessing learning efficiency, encompassing response, knowledge gain, behavior, and accomplishments. This approach is particularly relevant to our study as it provides a structured way to evaluate the differences in learning outcomes between online and physical learning. Additionally, the role of student attitudes, as highlighted by (Hellmich, Löper, and Görel, 2019) is critical in understanding the efficacy of these learning environments, making it a key component of the analysis.

2.3 Learning Satisfaction

Learning satisfaction (Jiang et al. 2021) is a critical component of the educational experience, encompassing the emotional and attitudinal responses of students to their learning environments. It is driven by the degree to which students feel their learning needs—both physiological and emotional—are being met. While this connection between student satisfaction and academic outcomes is well-documented, the extent and nature of this relationship vary depending on the learning context. For instance, Rajabalee and Santally (2021) found a clear link between student satisfaction, participation in online courses, and subsequent academic performance, suggesting that engagement in online settings can significantly influence how students perceive their educational experience. However, Zhang and Lin (2020) provide a more nuanced view, arguing that learning satisfaction is a holistic construct that reflects not only the fulfillment of expectations but also the emotional journey of students through their educational experiences. This broader perspective emphasizes the importance of aligning educational settings with student expectations, an area where both online and physical learning environments can struggle or succeed depending on various factors.

Building on background, Eagleton (2015) the multifaceted influences on learning satisfaction, including student traits, instructor effectiveness, course content, and the overall educational environment. This complexity suggests that while student satisfaction can be a useful metric, it is also shaped by a wide array of variables that may interact differently across online and physical learning contexts. While, Topala and Tomozii (2014) supports the need for validated tools to measure student satisfaction, indicating that the subjective nature of satisfaction can be systematically assessed. Cheng, Mo, and Duan (2023) underscore the role of motivation in e-learning, particularly during the COVID-19 pandemic, pointing to the challenges faced in maintaining satisfaction in online environments. These studies collectively highlight the importance of understanding the specific factors that drive satisfaction in different learning settings.

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2.4 Physical and Online Learning

Empirical evidence from prior studies consistently indicates a stronger association between face-to-face instruction and enhanced academic outcomes compared to online learning. Specifically, Tratnik et al. (Tratnik, Urh, and Jereb 2019) demonstrated that business English students achieved higher learning outcomes in traditional classroom settings than their peers in online environments. Similarly, Bir (2019) found a statistically significant improvement in academic performance among engineering students in face-to-face courses compared to online versions. Additionally, Faux and Black-Hughes [48] highlighted better performance metrics and greater student satisfaction within traditional instructional settings, particularly in a social work history curriculum. These studies collectively suggest that traditional, in-person education may be more effective in promoting academic achievement and satisfaction.

However, what these studies lack is an exploration of the underlying reasons why face-to-face instruction often yields better outcomes. They also do not fully account for the nuances of how different disciplines or student demographics might interact with these instructional modes. Moreover, while these studies provide valuable insights into the advantages of physical learning, they do not extensively examine the potential benefits or unique challenges of online learning environments, especially in the context of a rapidly changing educational landscape influenced by the COVID-19 pandemic. Moreover, several studies (Park and Choi, 2009; D. Yang, Baldwin, and Snelson, 2017) have ubiquitously corroborated high retention indices for on-site pedagogical environments in contrast to digital course offerings.

The COVID-19 crisis has significantly disrupted conventional classroom instruction, leading to a global shift towards online education (Lavonen and Salmela-Aro, 2022; Iglesias-Pradas et al., 2021; Hsiao, 2021). The interplay between COVID-19 and virtual education has markedly transformed the existing educational terrain, establishing online teaching as the only viable avenue for disseminating knowledge. Past research has scrutinized students' involvement in digital learning environments. Gray and Diloreto (2016) explored the relationship between course layout, student interaction, engagement, and instructor involvement, assessing their influence on student contentment and perceived knowledge acquisition. Czerkawski and Lyman (2016) proposed a pedagogical design model complemented by tactics to augment student participation in virtual education. Abou-Khalil et al. (2021) delved into efficient engagement methodologies as discerned by tertiary education students in online classrooms within resource-limited environments. Ristić et al. (2023) assessed student performance within a digital learning schema, highlighting that a flexible e-learning platform can bolster student educational achievements.

Despite these contributions, a gap remains in understanding how online and physical learning environments compare in terms of their impact on student learning outcomes, particularly in a post-pandemic context. This study aims to fill this gap by systematically comparing the effectiveness of online and physical learning modalities in a management course for first-year students. By doing so, it seeks to provide a more comprehensive understanding of how different instructional methods can be optimized to improve educational practices in diverse learning environments.

2.5 Theory and Hypotheses

The proposed conceptual framework for evaluating student satisfaction with learning performance integrates various factors, including both online and physical learning course units. This framework is informed by prior research that has explored the differences in student satisfaction and learning outcomes between these two instructional methods. Even though prior studies (Kamalia, Sakti, and Kurniawan, 2022; Yang et al., 2022; Valentino et al., 2021) have examined and contrasted the satisfaction levels in learning performance between online and physical learning. The study utilized data collected from two different pre-test and post-test inquiries of online and physical education students. Based on the compilation of prior research outlined in the preceding sections, the author put forward a conceptual framework encompassing satisfaction of learning performance.

These studies collectively highlight the complex interplay between the mode of instruction and student satisfaction, underscoring the need for a nuanced approach to evaluating learning performance. Based on these insights, the current study proposes a conceptual framework that aims to systematically assess student satisfaction in both online and physical learning environments. The study utilized data collected from pre-test and post-test evaluations conducted with students in both online and physical learning settings. This approach allows for a direct comparison of how different instructional methods impact learning satisfaction over time. Figure 1 shows Model of Conceptual Framework. Following the examination of existing literature, this study has formulated the hypotheses for design as stated below:

H1: The degree of improvement in understanding Management Basis influences students' Satisfaction with learning performance in online learning.

H2: The degree of improvement in understanding Management Operations influences students' Satisfaction with learning performance in online learning.

H3: The degree of improvement in understanding Control Tools influences students' Satisfaction with learning performance in online learning.

H4: The degree of improvement in understanding Management Basis influences students' Satisfaction with learning performance in physical learning.

H5: The degree of improvement in understanding Management Operations influences students' Satisfaction with learning performance in physical learning.

H6: The degree of improvement in understanding Control Tools influences students' Satisfaction with learning performance in physical learning.

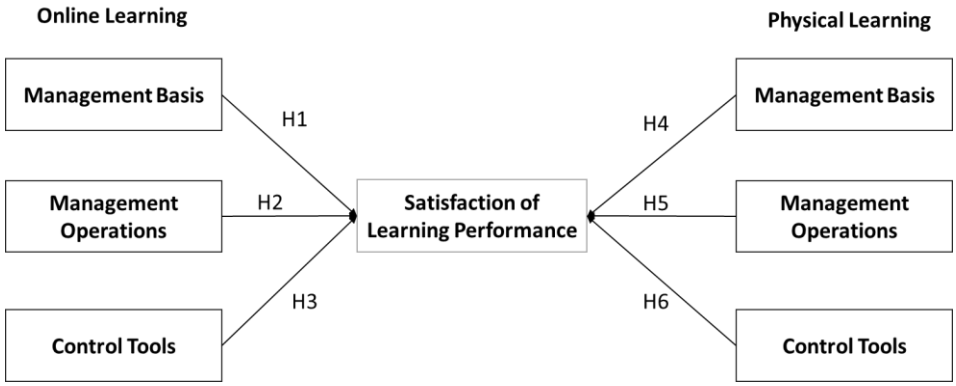

Figure 1: Model of Conceptual Framework

This conceptual framework serves as the basis for evaluating the effectiveness of different teaching methods on student satisfaction and provides a structured approach to understanding the factors that contribute to successful learning outcomes in both online and physical settings.

3. Materials and Methods

3.1 Sample and Data Collection

Using a longitudinal design, this research collected data from first-year students in the management curriculum at a private Taiwanese university. The study contrasted the pedagogical outcomes of virtual and traditional classroom settings. "Management" is a core three-credit course within the Business Administration Department covering broad management facets. Due to COVID-19, data was acquired from the same management education course and different first-year students at the beginning (February) and end of the semester (June) in 2022, primarily via email and line. yielding 65 responses. In 2023, with evolving pandemic dynamics, traditional feedback mechanisms were adopted, collecting data in classroom setting resulting in 63 responses from the first-year cohort, respectively. The questionnaire was created in Chinese. Subsequently, the questionnaire coding and translation process was carried out. The questionnaires were collected with the consent of the students, and all students in the classes participated.

3.2 Questionnaire Design and Variable Measurement

The initial development and design of the self-made questionnaire underwent multiple stages, anchored in theoretical principles and teaching materials, a review of related literature, and relevant research data assimilation. The collective information influenced the questionnaire's architecture and content. This design process was rooted in established academic principles, complemented by an in-depth literary survey to gain critical insights. Essential research findings were also integrated into the development phase. In January 2022, three information management and education experts rigorously assessed the questionnaire for validity. Based on their feedback, content alterations were made. The experts then affirmed its content accuracy. Unnecessary elements were discarded, particularly from the curriculum scale.

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The descriptions for the subsequent 14 items underwent refinements, and an additional question was introduced to measure learning satisfaction. The research utilized a 7-point Likert scale to capture participants' levels of agreement. This format, ranging from 'Strongly Disagree' to 'Strongly Agree,' facilitates straightforward data collection. The 7-point structure was chosen to obtain nuanced feedback and enhance the clarity of responses. This method aligns with customary research norms, balancing detail and user-friendliness. The study utilized statistical software package, SPSS 23.0 for analyzing the data. The reliability and validity of the questionnaire are discussed in the next section. Construct validity ensures a research scale accurately measures abstract concepts, involving convergent and discriminant validity. Convergent validity links questions to specific factors, while discriminant validity prevents questions from belonging to multiple factors. This study confirms all questions exhibit both validities, confirming the research scale's construct validity, shown in further sections.

3.3 Class Course

This study advanced management education using a framework grounded in theoretical management guidelines and an innovative approach to aid learners in understanding core concepts. During the first fourteen weeks, emphasis is placed on deepening subject knowledge and analytical skills. The curriculum uses Professor Lin Jian Huang's "Introduction to Management, 6th Edition" from January 2022 for theoretical lessons. The survey, with its fourteen questions, aligns with topics such as organizational structure, corporate ethics, decision-making, HR management, effective leadership, communication strategies, and technology's role in oversight. Details of these classroom-focused questions can be found in Table 1, with 14 items specifically crafted to assess course satisfaction.

Table 1: Self-evaluation form before and after learning the management course

No.	Variable	Question
1	Management Basis	I understand the difference between organization and management.
2		I understand the impact of the management environment on the enterprise.
3		I understand the meaning of enterprise ethics and social responsibility.
4		I understand the importance of decision-making.
5		I understand the meaning of planning.
6		I understand the meaning of organizational design.
7		I understand the meaning of organizational change and learning.
8	Management Operations	I understand the meaning of human resources.
9		I understand the meaning of incentive theory.
10		I understand the meaning of leadership.
11		I understand the difference between a group and a team.
12		I understand the importance of communication in conflict management.
13	Control Tools	I understand the meaning of the basis of control.
14		I understand the tools of control.
15	Overall Satisfaction	The course design contributes to my Satisfaction with my learning performance (Posttest only).

4. Results

4.1 Validity and Reliability Analysis

The results from the factor analysis of the Management Course Satisfaction Scale show a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy at .833, indicating strong suitability. Additionally, Bartlett's test of sphericity yielded a significance level of .000, well below the .05 threshold, further supporting the scale's appropriateness for factor analysis. It's worth noting that a higher KMO value, as explained by Kaiser (1974), indicates better correlation between variables for factor analysis.

The scale's initial factor, labeled “Management Course Dimension,” covers questions 1 to 7, addressing topics like organizational differences and decision-making. The second factor (questions 8 to 12) delves into areas such as leadership and communication. The third factor includes questions 13 and 14, focusing on control aspects. The factor analysis results of this study demonstrate that the eigenvalues of each facet surpass 1, all factor

loadings exceed 0.5, and the proportion of variance elucidated by each facet exceeds 50%, all aligning with the criteria scholars' advocate.

Construct validity ensures a research scale accurately measures abstract concepts, involving convergent and discriminant validity. Convergent validity links questions to specific factors, while discriminant validity prevents questions from belonging to multiple factors. This study confirms all questions exhibit both validities, confirming the research scale's construct validity. See Table 2 for the factor facet distribution summary. Following the results of the factor analysis, the study divides the course unit into three clear sections: Management Basis (H1, H4), Management Operations (H2, H5), and Control Tools (H3, H6).

Table 2: Management Course Satisfaction Scale Factor Analysis(n=128)

No.	Management Operations	Management Basis	Control Tools
12	.828		
10	.824		
9	.816		
11	.775		
8	.634		
4		.606	
1		.829	
5		.825	
6		.781	
7		.632	
2		.597	
3		.564	
14			.879
13			.585
Eigenvalues	3.780	2.949	1.991
Explained Variance	37.333	22.491	7.726
Cumulative Explained Variance	37.333	59.824	67.550

The assessment applies item analysis to measure test items by analyzing participants' pre- and post-learning improvement levels. Which means that students were asked to assess themselves before the beginning (pre-learning) of the course and then at the end of the course (post-learning). The approach based on internal consistency is used to divide the cumulative scale scores into two clear categories: the top 27% as the higher-ranking and the bottom 27% as the lower-ranking respondents. This division aids in contrasting the average scores for each test item.

A significance level of $p<.05$ is set for each item to determine its discriminatory strength. If the critical ratio exceeds 3, it indicates the item's discriminatory solid capacity. This method was used to evaluate the management course scale's efficacy. The results showed that all 14 items achieved a significance level of $p<.05$, emphasizing the validity of these questions. The analysis indicates that all 14 questions differentiate between the higher and lower-ranking groups. Table 3 offers a detailed analysis of the scale items' results. The adopted strategy provides insights into each question's discriminatory capability and affirms the overall efficacy of the measurement scale in evaluating the management course's impact. The thorough results highlight the solidness of the item analysis method in assessing the questions' discriminatory capabilities and reinforce the assessment's reliability.

Moreover, to determine the reliability of the measurement scale, Cronbach's α internal consistency coefficient is utilized. The results show an overall scale Cronbach's α coefficient of .898, with individual subdomains ranging between .801 and .909. Generally, a reliability coefficient above .70 indicates good measurement consistency, while coefficients below .35 are deemed insufficient (Nunnally, 1978).

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Table 3: Validity and reliability analysis (n=128).

NO	F	Critical Value t	MD	SE	Cronbach's α if the item is deleted
1	3.50	-8.41***	-1.55	0.18	0.909
2	1.22	-10.12***	-1.95	0.19	0.903
3	2.66	-8.14***	-1.65	0.2	0.907
4	12.87	-11.69***	-2.19	0.19	0.801
5	12.73	-10.37***	-2.22	0.21	0.808
6	10	-9.91***	-2	0.21	0.904
7	13.84	-8.93***	-1.93	0.22	0.906
8	16.57	-11.48***	-2.23	0.19	0.901
9	3.32	-10.98**	-2.16	0.19	0.804
10	43.60	-11.8***	-2.85	0.19	0.803
11	6.57	-7.68***	-1.7	0.22	0.906
12	6.62	-5.9***	-1.38	0.23	0.811
13	21.47	-7.8***	-1.82	0.23	0.904
14	30.67	-3.1*	-4.82	0.15	0.816

Note: ***p＜.001, **p<0.01, *p<0.05

4.2 Descriptive Analysis

Our study encompassed a representative sample of 128 participants from the collected data via student questionnaires. The course was delivered online in 2022 (February-June) and transitioned to in-person instruction in 2023 (February-June). The same instructors taught the subject course during both semesters. These participants were actively engaged in the management course during the second semester of the academic year 2021-2022. It is pertinent to highlight that within the sample, two specific subsets or classes emerged as noteworthy due to their gender composition. Notably, one class had a female majority, with 50 female students representing 76.9% of its composition. This observation may have implications for further gender-based analyses in academic contexts.

Similarly, the second class consisted of 40 female students, making up 63.5% of the total participants in that class. Notably, the research was expanded to include a distinct subset: 90 female first-year students from the Department of Business Administration. The subset accounted for 70.3% of the research participants, emphasizing its pivotal role and influence within the overarching study. The observed distribution in this sample is especially noteworthy as it reflects the demographic structure of the larger reference group. The unity between the model and the larger student body is evident when consulting Table 4, which graphically delineates the parity between the research participants' composition and the more extensive student group. The sample distribution indicates that most business management students at the case university are female. This proportion in the study aligns with that of the parent system.

Table 4: Respondent data descriptive statistics

Modes	Gender	N	Pec. (%)
Online Learning	Female	50	76.9
	Male	15	23.1
	Total	65	100
Physical Learning	Female	40	63.5
	Male	23	36.5
	Total	63	100
Total	Female	90	70.3
	Male	38	29.7

Modes	Gender	N	Pec. (%)
	Total	128	100
Business Administration Department	Female	494	71.6
	Male	196	28.4
	Total	690	100

4.3 Important Performance Analysis (IPA)

The research comprised six sequential steps for data collection and IPA, executed using IBM SPSS Statistics 23, which are delineated below:

- Verify the credibility and consistency of the questionnaire.
- Calculate the average of self-evaluated ratings given by participants before and after the instructional phase for each item.
- Ascertain the differences between the post-instructional and pre-instructional mean scores for every item.
- Represent the scores before instruction on the x-axis and those after instruction on the y-axis to formulate the coordinates for a scatter plot (x, y).
- Derive the average score before instruction (and after instruction) for all items and set it as the bifurcation line on the x-axis (y-axis); then, use this coordinate duo (x, y) as the focal point to demarcate four sectors.
- Compare each set of pre- and post-instruction scores for the 14 items to the central reference and allocate them into one of the four sectors.

There was a noticeable significance when comparing online and physical learning ($p<0.001$, $t=10.29$). Additionally, utilizing the "paired sample test" to evaluate various learning methods revealed marked differences in students' self-evaluation scores for online learning ($p<0.001$, $t=17.05$) and physical learning ($p<0.001$, $t=19.10$) before and after instruction. The average enhancement scores stood at 1.76 for online learning and 2.59 for physical education. This analysis suggests that students' self-assessed scores and overall improvement after the course are notably higher in physical classes than in online ones, as illustrated in Table 5.

Table 5: Paired sample test

Modes	Pair	Pairwise Difference			t	DF
		Mean	SD	SE		
Online Learning	After Class - Before Class	1.76	0.58	0.05	17.05***	64
Physical learning	After Class - Before Class	2.59	0.62	0.08	19.10***	62

Note: ***p＜.001

Mentioning to Table 6, in the context of online learning, the IPA method was employed. Here, scores after instruction were charted on the x-axis and those before instruction on the y-axis. Creating a scatter plot based on the average pre- and post-instruction scores defined a reference point at the connection of these averages (3.79, 5.55). Following these data, the 14 items were divided into four sectors. Quadrant I housed items 1, 2, 3, 4, 5, 8, 10, 11 and 12.

Table 6: Descriptive statistics- online learning (n=65)

No	Before learning		After learning		Improvement		Quadrant
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
01	3.75	0.85	5.92	0.76	2.17	0.80	I
02	3.77	1.00	5.92	0.76	2.15	0.97	I
03	4.28	0.80	6.20	0.67	1.92	0.79	I
04	3.80	1.21	5.86	0.81	2.06	1.16	I
05	3.88	1.15	5.62	0.70	1.74	0.85	I

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No	Before learning		After learning		Improvement		Quadrant
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
06	3.20	0.96	4.82	0.56	1.62	0.84	III
07	3.40	1.17	4.97	0.87	1.57	0.77	III
08	3.97	1.12	6.08	0.85	2.11	1.14	I
09	3.67	1.31	5.95	0.94	2.28	1.15	II
10	4.50	1.20	6.20	0.79	2.05	1.20	I
11	3.96	1.27	6.05	0.86	2.10	1.10	I
12	3.91	1.16	6.14	0.86	2.23	1.07	I
13	3.55	0.83	4.20	1.06	0.65	0.68	III
14	3.40	1.06	3.80	1.00	0.40	0.46	III
RNG	1.30	0.51	2.40	0.50	1.88	0.74	
AVG	3.79	1.08	5.55	0.82	1.76	0.93	

Meanwhile, Quadrant III included items 6, 7, 13 and 14. This distribution can be visualized in Figure 2. Notably, Quadrant IV had no items, implying that no items had high initial comprehension but limited growth potential. On the other hand, Quadrant II contained only one item, namely item 9, indicating low foundational knowledge but showed notable growth. For the four items in Quadrant III, initial understanding and subsequent progress were limited, pointing toward the need for a more focused instructional approach.

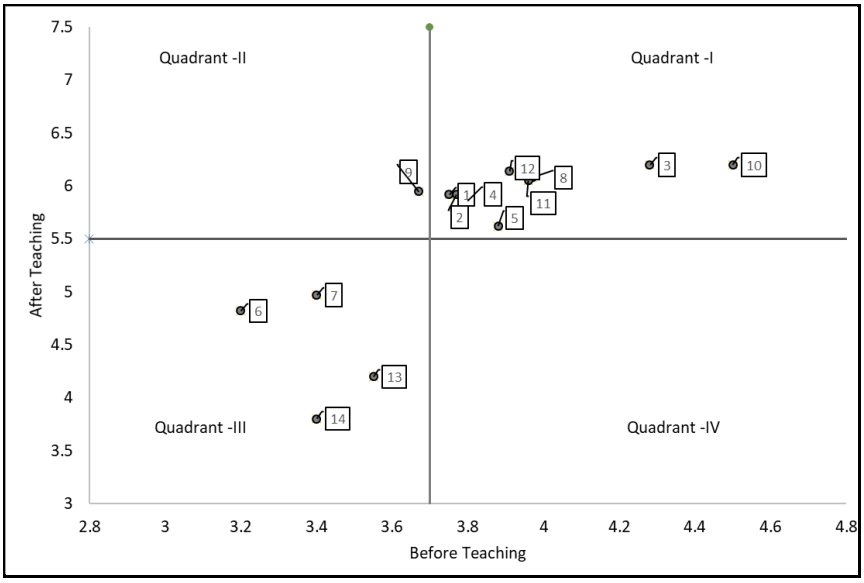

Figure 2: IPA for Online Learning

Additionally, the results of physical learning depicted in Table 7, the average scores before and after teaching (3.38, 5.97) were used to set a reference point. Items 3, 4, 8, 10, 11, and 12 found their places in Quadrant I. Items 2 and 5 fell into Quadrant II. Items 1, 6, 7, 13, and 14 were allocated to Quadrant III. Concluding the categorization, item 9 was positioned in Quadrant IV, as visualized in Figure 3. The positioning of item 9 showed strong foundational knowledge but needed more growth prospects. Conversely, the two items in Quadrant II represent subjects with initially lower comprehension but significant post-instructional improvement. In Quadrant III, the five items present suggestions at low baseline knowledge corresponding with minimal subsequent growth, indicating the importance of increasing teaching strategies for these items.

When examining Quadrant III, a noticeable difference emerges: online instruction has four items, while physical instruction contains five. The observation underscores educators' need to dedicate more resources and effort to enhance the delivery of these topics. Notably, items 6, 7, 13, and 14 are common to online and physical modes. Enhancements in the teaching approach for these items would benefit both instructional methods. Within Quadrant II, which signifies subjects with low foundational understanding but marked improvement post-

instruction, online learning displayed one item, whereas physical learning highlighted two items. The analysis indicates a more significant improvement in subjects with initial low comprehension in physical classes compared to online settings.

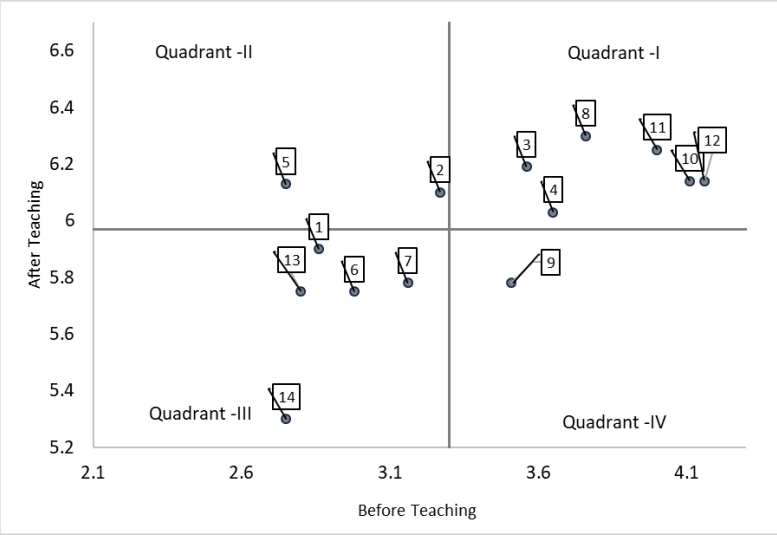

Figure 3: IPA for Physical Learning

Table 7: Descriptive statistics-physical learning (n=63)

No.	Before Learning		After Learning		Improvement		Quadrant
	Mean	SD	Mean	SD	Mean	SD	
1	2.86	1.01	5.90	0.95	3.05	1.08	III
2	3.27	1.07	6.10	0.86	2.83	1.11	II
3	3.56	1.00	6.19	0.86	2.63	1.15	I
4	3.65	1.08	6.03	0.86	2.38	1.08	I
5	2.75	0.97	6.13	0.89	3.38	1.28	II
6	2.98	0.98	5.75	1.00	2.76	1.23	III
7	3.16	1.05	5.78	0.96	2.62	1.26	III
8	3.76	1.00	6.30	0.80	2.54	1.12	I
9	3.51	1.24	5.78	1.10	2.27	1.26	IV
10	4.11	1.28	6.14	0.91	2.03	1.15	I
11	4.00	1.37	6.25	0.88	2.25	1.14	I
12	4.16	1.15	6.14	0.84	1.98	1.04	I
13	2.80	1.33	5.75	1.02	2.95	1.33	III
14	2.75	1.02	5.30	0.81	2.55	0.71	III
RNG	**1.41**	**0.40**	**1.00**	**0.30**	**1.40**	**0.62**	
AVG	**3.38**	**1.11**	**5.97**	**0.91**	**2.59**	**1.14**	

Quadrant IV, distinguished by subjects with robust initial comprehension and marginal growth prospects, saw item 9 for physical learning, while online learning didn't manifest any. Meanwhile, Quadrant I, indicative of subjects with solid foundational knowledge and significant subsequent growth, encompasses nine items for online learning and six for physical learning. Notably, items 3, 4, 8, 10, 11, and 12 were present in both instructional formats, majorly addressing aspects tied to management operations (items 8-12).

Based on the self-reported data gathered before and after the research, the findings in Table 6 and Table 7 and the corresponding Figure 4 indicate that average post-learning scores for both online and physical learning notably outpace the scores before learning. For online learning, the scores saw an uptick from 3.79 to 5.55. Conversely, for physical learning, scores climbed from 3.38 to 5.97. While the starting average score for online

teaching is marginally higher than its physical counterpart, the post-instruction average score in the physical setting surpasses online learning. Moreover, the advancement in student performance in physical learning (2.59) is more significant than online instruction (1.79). The analyses suggest that, regardless of the initial knowledge variances, all 14 items evaluated in this research showed marked improvement across both teaching modalities.

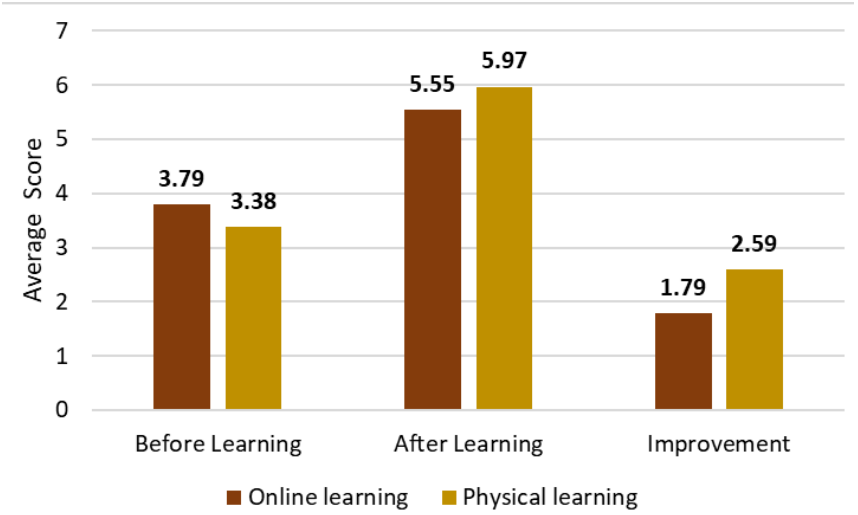

Figure 4: Mean score comparison in online and physical learning

Additionally, when considering the overall Satisfaction with the learning outcomes, learners provide feedback post-learning. As per the results from Table 8, the average satisfaction score for online learning stands at 4.86, less than the score for physical learning at 6.41. The efficacy of physical learning surpasses that of online learning. Moreover, female students are more satisfied than male students in online and traditional classroom settings.

Table 8: Overall Satisfaction with Learning Performance

Item	Gender	N	Mean	SD
Online learning	Male	15	4.67	0.82
	Female	50	4.92	0.85
	Total	65	4.86	0.84
Physical learning	Male	23	6.17	0.89
	Female	40	6.55	0.68
	Total	63	6.41	0.78
Total	Male	38	5.58	1.13
	Female	90	5.67	1.11
	Total	128	5.64	1.12

4.4 Regression Analysis

Table 9 offers a detailed breakdown of the analytical findings for online learning. It's worth noting that the variables A1 (Management Basis) and A2 (Management Operations) have p-values below 0.05, signifying their significant influence in the study's context. The derived equation for the overall Satisfaction with learning performance is represented as Satisfaction with learning performance = 0.315 * A1 + 0.201 * A2. The analysis reveals a positive association between overall satisfaction and the variables A1 (Management Basis) and A2 (Management Operations) in online learning among first-year students. However, the variable A3 (Management Tools) does not show a significant effect.

Table 9: Multiple regression analysis for online learning (n=65)

Learning improvement	Unstandardized Coefficient		Standardized Coefficient	T	Sig.	VIF	Rank
	B	SE	β				
(Constant)	1.322	.330		4.006	.000		
A1	.583	.215	.315	2.717	.009*	3.10	1
A2	.408	.154	.201	3.043	.003*	3.51	2
A3	.404	.234	.257	1.728	.089	1.64	

Note: (a) $p < 0.05$, F=6.484, Adjusted R square = .307 (b) Dependent variable: the overall Satisfaction with learning performance

The results differ when the same model is applied to analyze physical learning data. The following equation emerges: the overall Satisfaction with learning performance = 0.199 * A1 + 0.168 * A2 + 0.158 * A3. The result displays that for first-year students, there's a favorable connection between overall Satisfaction and all three variables. A1 (Management Basis) has the most substantial influence, succeeded by A2 (Management Operations) and then A3 (Control Tools) in a decreasing order. A comprehensive analysis is laid out in Table 10.

Table 10: Multiple regression analysis for physical learning(n=63)

Learning improvement	Unstandardized Coefficient		Standardized Coefficient	T	Sig.	VIF	Rank
	B	SE	β				
(Constant)	.354	.810		.437	.044		
A1	.304	.255	.199	1.191	.039*	2.72	1
A2	.290	.221	.168	.407	.045*	2.52	2
A3	.238	.189	.158	1.258	.013*	1.60	3

Note: (a)***p＜.001, *p<0.05, F=3.073, Adjusted R square = .648 (b) Dependent variable: the overall Satisfaction with learning performance

4.5 Learning Mode Effectiveness

The analysis in Table 11 revealed significant differences in improvements and overall satisfaction among different learning approaches. Physical learning outperformed online courses, with notable differences in A3 (control tools, p=0.01) and overall satisfaction (p=0.02). Further examinations emphasized the superiority of traditional classroom courses in terms of improvement and satisfaction. E-learning courses exhibited higher standard deviations, indicating a wider range of progression and satisfaction ratings in online education.

Table 11: A comparison of learning mode effectiveness

Learning improvement	Physical learning(n=63)		Online Learning(n=65)		T	p
	Mean	SD	Mean	SD		
A 1	2.81	0.83	1.89	0.84	6.69	0.56
A 2	2.22	0.92	2.14	0.95	6.69	0.58
A 3	1.91	0.86	1.39	0.88	0.43	0.01*
Overall Satisfaction	6.41	0.78	4.89	0.85	5.68	0.02*

Note: ***p＜.001, *p<0.05

5. Discussion

This research aimed to assess the efficacy of educational methods in traditional physical and online learning environments, evaluate shifts in student performance distribution within the IPA quadrant for both traditional and online courses, delve into variations in student engagement and educational impact within specific course

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units, and discern gender differences in overall learning efficacy in both learning contexts. The pedagogies for online teaching were restricted to the online teaching platforms, using PowerPoint slides, online resource materials as the main source of method of instruction and online assignment, quizzes, and discussions for assessing the student performance, while physical setting included the use of the above in addition to the in-person learning and discussions, field trips and project and task-based learning.

Through our analyses, we gained deeper insights into the nuances of the management course. The item analysis facilitated a meticulous assessment of each test item, suggesting that all 14 questions adeptly distinguish among students with varying skill levels, as corroborated by the significant level of $p < 0.05$. The finding emphasizes the credibility of these questions in differentiating between participants' proficiencies.

Employing regression analysis, the study probed the relationships between the independent variables ("Management Basis," "Management Operation," and "Control Tools") and the dependent variable ("Satisfaction of Learning Performance"). The model presented an adjusted R2 value of 0.679 for physical learning, signifying that 67.9% of the behavioral intention variance is accounted for. Notably, unlike online sessions, students showcased enhanced progress in their self-assessment scores after physical learning. Furthermore, through regression analysis, it was determined that the enhancement of A1 (Management Basis) and A2 (Management Operations) has a greater impact on satisfaction in online learning compared to physical learning. This disparity could be attributed to online teachers dedicating more attention to their students, offering real-time quizzes, and providing various digital resources tailored to autonomous learning modes, all of which contribute to enhancing students' learning performance (Haleem et al., 2022; Tong et al., 2022).

In our analysis, hypotheses were categorized based on the learning mode: online or physical. Each category contained three core hypotheses. The primary hypotheses for online learning investigated the influence of Management Basis comprehension on students' overall learning satisfaction. Results revealed that both Management Basis (H1) and Management Operations (H2) considerably influence student satisfaction, whereas Control Tools (H3) had no notable impact. Conversely, for physical learning, the Management Basis (H4), Management Operations (H5), and Control Tools (H6) all positively affected student satisfaction, suggesting that the complexities of control tools are better comprehended via traditional teaching methods (Hung et al., 2009; Mrazek et al., 2019).

Table 12 and Figure 5 delineate the associations between the learning modalities (online vs. physical) and their respective hypotheses on their influence on students' learning satisfaction. The data presents a breakdown of each theory and its results, clarifying the supported and unsupported assumptions. The study offers an analytical perspective on the differential impacts of instructional modes on student satisfaction levels.

Table 12: Result of Hypotheses

Modes	Hypotheses	Results
Online Learning	H1- The degree of improvement in understanding of "Management Basis" influences students' overall Satisfaction of learning performance.	Supported
	H2- The degree of improvement in understanding "Management Operations" influences students' overall Satisfaction with learning performance.	Supported
	H3- The degree of improvement in understanding "Control Tools" influences students' overall Satisfaction with learning performance.	Not Supported
Physical Learning	H4- The degree of improvement in understanding of "Management Basis" influences students' overall Satisfaction of learning performance.	Supported
	H5- The degree of improvement in understanding "Management Operations" influences students' overall Satisfaction with learning performance.	Supported
	H6- The degree of improvement in understanding "Control Tools" influences students' overall Satisfaction with learning performance.	Supported

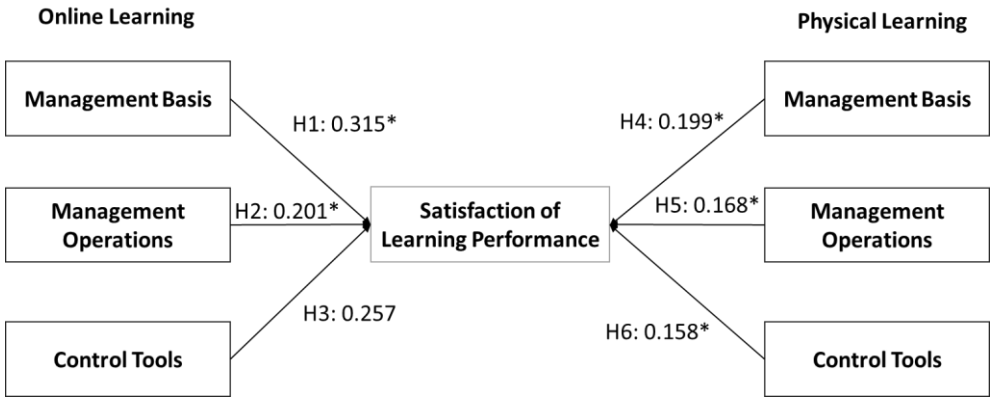

Figure 5: Result Score of Hypotheses

Management control tools and technologies often require extra explanation and physical learning implementation by instructors unlike Management Basis and Management Operations, which are based on foundational and basic theories and can be learned more easily through online methods. Online teachers often pay more attention to their students and offer real-time quizzes or various digital resources based on autonomous learning modes to enhance students' learning satisfaction. Thus, incorporation of digital teaching methods to enhance learning efficacy has the potential to increase overall learner satisfaction.

The findings of the study highlight the performance improvement post-learning effectiveness associated with physical learning as compared with online teaching. The improvement in the physical teaching, thus, correlates with the student satisfaction, including aspects such as variables used in the study, management basis, management operations, control tools utilization. Whereas, in terms of online teaching, the learning satisfaction is nuanced, where only management basis and management operations have positive correlation in the results Including online pedagogy is essential to enhance the learning efficacy due to its potential for increased student satisfaction.

The study develops from the previous research by evaluating the learning performances in both online and physical learning environments. The study has its implications for the educators and the overall educational landscape. The results of the study can be leveraged as guiding compass for educators in terms of refining their teaching methodologies, in order to create effective learning experiences and enhancing the course design. Data driven insights help educators to utilize specific areas where students might find it difficult or vice versa, enabling educators to precisely implement focused interventions and support mechanisms in time complex situations. The study, thus, not only has academic contributions but also offers a tangible framework to elevate educational practices leveraging strategic insights and personalized interventions.

6. Conclusions and Future Works

The study aimed to analyze the student performance satisfaction in both online and teaching methods of learning. The study explored the direct implications for continued student engagement in a foundational management course tailored for first-year students in Department of Business Administration. The research presents distinct findings based on educational efficacy comparison, disparities between physical and online learning and correlation with the learning satisfaction. It was observed that improvements in scores for physical learning were notably higher than for online learning. Specifically, online learning scores rose from 3.79 to 5.55, while physical learning scores jumped from 3.38 to 5.97 ($p<0.001$, $t=10.29$). There was a marked difference in Satisfaction and improvements between physical and digital learning, with physical modes faring better. Independent t-tests revealed no significant differences in the areas of "Management Basis" ($p=0.57$) and "Management Operations" ($p=0.68$). Yet, "Control Tools" ($p=0.01$) and overall Satisfaction ($p=0.02$) showed significant variances.

For physical learning, theoretical units like “Management Basis” ($p=.039$, $\beta=0.199$), “Management Operations” ($p=.045$, $\beta=0.168$), and "Control Tools” ($p=.013$, $\beta=0.158$) all positively correlated with overall learning satisfaction. For online methods, only “Management Basis” ($p=.009$, $\beta=0.315$) and “Management Operations” ($p=.003$, $\beta=0.201$) displayed positive relationships with Satisfaction, while "Control Tools" lacked a significant link. Because of the positive impact of improvements in A1 and A2 on satisfaction, online learning proves to be more effective than physical learning. This research sheds light on the intricate relationship between teaching

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methods, learning outcomes, and student satisfaction. The insights gleaned can influence curriculum design and teaching approaches. By utilizing data analytics, the study foresees improvements in first-year student outcomes, aiming to refine teaching methodologies, boost student achievements, and devise a superior curriculum evaluation system to enhance the educational quality offered.

In future studies, combining student performance data from both mid-term tests and final exams can offer a comprehensive view of student progress. Analyzing the joint data can provide insights into student understanding, mastery, and challenge areas throughout their learning journey. Such insights can guide teachers in refining teaching methods and providing additional support. By evaluating both mid-term and final results, the long-term effectiveness of teaching strategies can be better understood and improved.

References

Abou-Khalil, Victoria, Samar Helou, Eliane Khalifé, MeiRong Alice Chen, Rwitajit Majumdar, and Hiroaki Ogata. 2021. "Emergency Online Learning in Low-Resource Settings: Effective Student Engagement Strategies." *Education Sciences* 11 (1), pp 24. https://doi.org/10.3390/educsci11010024.

Agrawal, Somya, and Shwetha M. Krishna. 2021. "Communication Apprehension and Psychological Well-Being of Students in Online Learning." *Behavioral Sciences* 11 (11), pp 145. https://doi.org/10.3390/bs11110145.

Alshammary, Farhan Mohammed, and Waleed Salim Alhalafawy. 2023. "Digital Platforms and the Improvement of Learning Outcomes: Evidence Extracted from Meta-Analysis." *Sustainability* 15 (2), pp 1305. https://doi.org/10.3390/su15021305.

Bir, Devayan Debashis. 2019. "Comparison of Academic Performance of Students in Online Vs Traditional Engineering Course." *European Journal of Open, Distance and E-Learning* 22 (1), pp 1–13. https://doi.org/10.2478/eurodl-2019-0001.

Cheng, Xiaoliang, Weilan Mo, and Yujing Duan. 2023. "Factors Contributing to Learning Satisfaction with Blended Learning Teaching Mode among Higher Education Students in China." *Frontiers in Psychology* 14 (June). https://doi.org/10.3389/fpsyg.2023.1193675.

Czerkawski, Betul C., and Eugene W. Lyman. 2016. "An Instructional Design Framework for Fostering Student Engagement in Online Learning Environments." *TechTrends* 60 (6), pp 532–39. https://doi.org/10.1007/s11528-016-0110-z.

Danchikov, Evgeniy Aleksandrovich, Natalia Alekseevna Prodanova, Yulia Nikolaevna Kovalenko, and Tatiana Grigorievna Bondarenko. 2021. "Using Different Approaches to Organizing Distance Learning during the COVID-19 Pandemic: Opportunities and Disadvantages." *Linguistics and Culture Review* 5 (S1), pp 587–95. https://doi.org/10.21744/lingcure.v5nS1.1444.

Eagleton, Saramarie. 2015. "An Exploration of the Factors That Contribute to Learning Satisfaction of First-Year Anatomy and Physiology Students." *Advances in Physiology Education* 39 (3), pp 158–66. https://doi.org/10.1152/advan.00040.2014.

Gray, Julie A, and Melanie Diloreto. 2016. "The Effects of Student Engagement , Student Satisfaction , and Perceived Learning in Online Learning Environments." *International Journal of Educational Leadership Preparation* 11 (1).

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. 2022. "Understanding the role of digital technologies in education: A review". *Sustainable Operations and Computers*, 3, pp 275-285.

Hellmich, Frank, Marwin F. Löper, and Gamze Görel. 2019. "The Role of Primary School Teachers' Attitudes and Self-efficacy Beliefs for Everyday Practices in Inclusive Classrooms – a Study on the Verification of the 'Theory of Planned Behaviour.'" *Journal of Research in Special Educational Needs* 19 (S1), pp 36–48. https://doi.org/10.1111/1471-3802.12476.

Hill, Andrew, Yu, Wilson, Hawken, Singh, and Lemanu. 2011. "Medical Students-as-Teachers: A Systematic Review of Peer-Assisted Teaching during Medical School." *Advances in Medical Education and Practice*, June, 157. https://doi.org/10.2147/AMEP.S14383.

Hsiao, Yu-Chen. 2021. "Impacts of Course Type and Student Gender on Distance Learning Performance: A Case Study in Taiwan." *Education and Information Technologies* 26 (6), pp 6807–22. https://doi.org/10.1007/s10639-021-10538-8.

Hung, Shin-Yuan, Wen-Ju Yu, Kuang-Lo Liou, and Shih-Chi Hsu. 2009. "Exploring E-Learning Effectiveness Based on Activity Theory: An Example of Asynchronous Distance Learning." *MIS Review* 15 (1), pp 63–87.

Ifenthaler, Dirk, Clara Schumacher, and Jakub Kuzilek. 2023. "Investigating Students' Use of Self-assessments in Higher Education Using Learning Analytics." *Journal of Computer Assisted Learning* 39 (1), pp 255–68. https://doi.org/10.1111/jcal.12744.

Iglesias-Pradas, Santiago, Ángel Hernández-García, Julián Chaparro-Peláez, and José Luis Prieto. 2021. "Emergency Remote Teaching and Students' Academic Performance in Higher Education during the COVID-19 Pandemic: A Case Study." *Computers in Human Behavior* 119 (June), pp 106713. https://doi.org/10.1016/j.chb.2021.106713.

Jiang, Haozhe, A. Y. M. Atiquil Islam, Xiaoqing Gu, and Jonathan Michael Spector. 2021. "Online Learning Satisfaction in Higher Education during the COVID-19 Pandemic: A Regional Comparison between Eastern and Western Chinese Universities." *Education and Information Technologies* 26 (6), pp 6747–69. https://doi.org/10.1007/s10639-021-10519-x.

Jiao, Zhiqiao, Yongjie Yang, Shuai Zhang, and Jing Xu. 2022. "A Comparative Study about Attitudes towards the Efficiency, Effectiveness, and Atmosphere of Offline and Online Learning among Medical Students." *Annals of Translational Medicine* 10 (23), pp 1270–1270. https://doi.org/10.21037/atm-22-5112.

Kamalia, Putri Ulfa, Norida Canda Sakti, and Riza Yonisa Kurniawan. 2022. "Comparative Study of Student Learning Outcomes in Online and Offline Learning during the Pandemic." *IJORER : International Journal of Recent Educational Research* 3 (6), pp 662–71. https://doi.org/10.46245/ijorer.v3i6.256.

Kikas, Eve, and Anna-Liisa Jõgi. 2016. "Assessment of Learning Strategies: Self-Report Questionnaire or Learning Task." *European Journal of Psychology of Education* 31 (4), pp 579–93. https://doi.org/10.1007/s10212-015-0276-3.

Kundu, Arnab, and Tripti Bej. 2021. "RETRACTED ARTICLE: COVID 19 Response: An Analysis of Teachers' Perception on Pedagogical Successes and Challenges of Digital Teaching Practice during New Normal." *Education and Information Technologies* 26 (6), pp 6879–6879. https://doi.org/10.1007/s10639-021-10503-5.

Laine, Kati, Päivi Tynjälä, Anneli Eteläpelto, and Raija Hämäläinen. 2019. "Students' Self-Reported Learning Outcomes after a Business Start-up Education Program." *International Journal of Training Research* 17 (2), pp 98–115. https://doi.org/10.1080/14480220.2019.1638621.

Lavonen, Jari, and Katariina Salmela-Aro. 2022. "Experiences of Moving Quickly to Distance Teaching and Learning at All Levels of Education in Finland." In *Primary and Secondary Education During Covid-19*, 105–23. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-81500-4_4.

Mrazek, Alissa J., Michael D. Mrazek, Jordan V. Reese, Arianna C. Kirk, Lefeba J. Gougis, Alex M. Delegard, David J. Cynman, Casey M. Cherolini, Peter C. Carr, and Jonathan W. Schooler. 2019. "Mindfulness-Based Attention Training: Feasibility and Preliminary Outcomes of a Digital Course for High School Students." *Education Sciences* 9 (3). https://doi.org/10.3390/educsci9030230.

Nunnally, Jum C. 1978. "An Overview of Psychological Measurement." In *Clinical Diagnosis of Mental Disorders*, 97–146. Boston, MA: Springer US. https://doi.org/10.1007/978-1-4684-2490-4_4.

Oktriani, Dilla Rifa, Achmad Hufad, and Nindita Fajria Utami. 2023. "Overcoming the Character Crisis in Children: Strategies, Outcomes, and Evaluations of Bina Desa Program." *Utamax : Journal of Ultimate Research and Trends in Education* 5 (2). https://doi.org/10.31849/utamax.v5i2.13758.

Park, Ji Hye, and Hee Jun Choi. 2009. "Factors Influencing Adult Learners' Decision to Drop out or Persist in Online Learning." *Educational Technology and Society* 12 (4), pp 207–17.

Pondee, Phattaraporn, Patcharin Panjaburee, and Niwat Srisawasdi. 2021. "Preservice Science Teachers' Emerging Pedagogy of Mobile Game Integration: A Tale of Two Cohorts Improvement Study." *Research and Practice in Technology Enhanced Learning* 16 (1), pp 16. https://doi.org/10.1186/s41039-021-00152-0.

Rajabalee, Yousra Banoor, and Mohammad Issack Santally. 2021. "Learner Satisfaction, Engagement and Performances in an Online Module: Implications for Institutional e-Learning Policy." *Education and Information Technologies* 26 (3), pp 2623–56. https://doi.org/10.1007/s10639-020-10375-1.

Ristić, Igor, Marija Runić-Ristić, Tijana Savić Tot, Vilmoš Tot, and Momčilo Bajac. 2023. "The Effects and Effectiveness of An Adaptive E-Learning System on The Learning Process and Performance of Students." *International Journal of Cognitive Research in Science, Engineering and Education* 11 (1), pp 77–92.

"Self-Reported Learning Outcomes at UMass Amherst." 2017.

Singh, Padmalini, Rupesh Sinha, Wei Lun Koay, Kok Ban Teoh, Prajna Nayak, Chung Hong Lim, Avinas Kumar Dubey, Abhijit Das, Iqbal Faturrahman, and Dwi Nita Aryani. 2021. "A Comparative Study on Effectiveness of Online and Offline Learning in Higher Education." *International Journal of Tourism & Hospitality in Asia Pasific (IJTHAP)* 4 (3), pp 102–14. https://doi.org/10.32535/ijthap.v4i3.1212.

Tong, D. H., Uyen, B. P., & Ngan, L. K. 2022. "The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane". *Heliyon*, *8*(12).

Topala, Ioana, and Simona Tomozii. 2014. "Learning Satisfaction: Validity and Reliability Testing for Students' Learning Satisfaction Questionnaire (SLSQ)." *Procedia - Social and Behavioral Sciences* 128 (April), pp 380–86. https://doi.org/10.1016/j.sbspro.2014.03.175.

Tratnik, Alenka, Marko Urh, and Eva Jereb. 2019. "Student Satisfaction with an Online and a Face-to-Face Business English Course in a Higher Education Context." *Innovations in Education and Teaching International* 56 (1), pp 36–45. https://doi.org/10.1080/14703297.2017.1374875.

Trigwell, Keith, and Michael Prosser. 1991. "Improving the Quality of Student Learning: The Influence of Learning Context and Student Approaches to Learning on Learning Outcomes." *Higher Education* 22 (3), pp 251–66. https://doi.org/10.1007/BF00132290.

Valentino, V.H., Heri Satria Setiawan, Muhammad Tri Habibie, Retna Ningsih, Dona Katrina, and Arman Syah Putra. 2021. "Online And Offline Learning ComparisonIn The New Normal Era." *International Journal of Educational Research & Social Sciences* 2 (2), pp 449–55. https://doi.org/10.51601/ijersc.v2i2.73.

Yang, Albert C.M., Irene Y.L. Chen, Brendan Flanagan, and Hiroaki Ogata. 2022. "How Students' Self-Assessment Behavior Affects Their Online Learning Performance." *Computers and Education: Artificial Intelligence* 3: 100058. https://doi.org/10.1016/j.caeai.2022.100058.

Yang, Dazhi, Sally Baldwin, and Chareen Snelson. 2017. "Persistence Factors Revealed: Students' Reflections on Completing a Fully Online Program." *Distance Education* 38 (1), pp 23–36. https://doi.org/10.1080/01587919.2017.1299561.

 ©The Authors

Zhang, Yining, and Chin-Hsi Lin. 2020. "Student Interaction and the Role of the Teacher in a State Virtual High School: What Predicts Online Learning Satisfaction?" *Technology, Pedagogy and Education* 29 (1), pp 57–71. https://doi.org/10.1080/1475939X.2019.1694061.

Zhu, Yue, Gretchen Geng, Leigh Disney, and Zihao Pan. 2023. "Changes in University Students' Behavioral Intention to Learn Online throughout the COVID-19: Insights for Online Teaching in the Post-Pandemic Era." *Education and Information Technologies* 28 (4), pp 3859–92. https://doi.org/10.1007/s10639-022-11320-0.