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INFORMATION TECHNOLOGY IN HIGHER EDUCATION: A STRATEGIC MODEL FOR SUSTAINABLE MISSION-BASED LEARNING IMPLEMENTATION

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Abstract
This study develops a strategic model for sustainable Mission-Based Learning (MBL) implementation in higher education, revealing the complex and paradoxical role of Information Technology (IT). The findings demonstrate that while academic leadership and IT directly and positively enhance learning strategies with hybrid learning combined with standards-based grading (SBG) proving particularly effective for digital writing instruction through personalized feedback IT exhibits a counterintuitive negative influence as a moderating variable. Specifically, it weakens the relationship between commitment and learning strategies and negatively correlates with sustainability outcomes, highlighting its dual nature. Collaboration and commitment are identified as critical drivers, strongly influencing successful strategy implementation, which in turn significantly promotes long-term sustainability. These results underscore the necessity of mission alignment, robust academic leadership, and collaborative commitment, while also pointing to essential structural changes such as optimized class sizes and revised assessments. Consequently, the research emphasizes an urgent need to resolve IT's contradictory impacts and to develop more effective frameworks for its sustainable integration, offering crucial insights for institutional policy and future innovation in higher education.

Keywords: Mission-Based Learning, Information Technology, Academic Leadership, Sustainability, Higher Education

Introduction

In the era of globalization, universities are compelled to continuously adapt to the dynamics of social change, rapid technological advancements, and the ever-evolving demands of the job market. Within an increasingly interconnected world, higher education institutions no longer function solely as centers of knowledge transfer but also act as catalysts for preparing the next generation with relevant competencies to compete on a global stage. The swift progress in information and communication technology, in particular, has forged a new educational and employment landscape, necessitating more adaptive, visionary, and future-oriented pedagogical approaches and curricula. This challenge is particularly complex for developing nations, which must often formulate strategies that move beyond merely adopting foreign models. Instead, they must tailor educational approaches to their specific local needs, cultural contexts, and socio-economic systems. This requires a delicate balance between leveraging global advancements and empowering domestic potential. The primary objective is to equip students with 21st-century skills such as critical thinking, creativity, collaboration, and digital literacy which are essential for full and successful participation in an interconnected society. In responding to this reality, the role of educators is also undergoing a significant transformation. Research, for instance, reveals the dual role of Islamic Religious Education (PAI) teachers, who serve not only as instructors but also as moral builders, spiritual leaders, motivators, and guardians of Islamic tradition. Their contribution is crucial in strengthening

religious values, maintaining social harmony, and shaping the character of the youth. This phenomenon underscores that institutional adaptation must go hand-in-hand with empowering educators on the front lines to meet contemporary challenges. However, efforts to transform higher education face myriad systemic obstacles. The implementation of project-based learning, designed to foster active problem-solving, and flexible curricula adaptive to student needs, often encounters significant implementation challenges. These barriers include limited funding, suboptimal academic information systems, talent gaps, and insufficient program socialization. Furthermore, the success of this transformation is highly dependent on the ability to align the university's vision and mission with its curriculum, strengthen effective academic leadership, and secure the sustained commitment of all stakeholders. The integration of information technology in learning, while holding immense potential to enhance educational effectiveness, also continues to face hurdles such as the digital divide, lack of coordination, and resistance to change. Consequently, a holistic, mission-based implementation strategy is required. Such a strategy must encompass aspects of academic leadership, collaboration, commitment, and sustainability, while considering the influence of information technology as a key driver of educational innovation. Without a sustainable technological framework, strong leadership, and collaborative commitment, even well-structured policies risk failing to drive meaningful educational transformation, particularly during uncertain transitions such as crises or systemic reforms. Ineffective academic leadership can hinder the development of a culture of innovation and collaboration on campus. Similarly, a lack of collaboration among stakeholders—lecturers, students, administrative staff, and external partners—often presents a major barrier to creating necessary synergies. Commitment to educational quality is the foundation for the sustainability of any program; therefore, governments need to strengthen supportive policies and regulations, while the private sector and industry can contribute through investments in technology and practices that support a vision of sustainable development.

This research aims to address this gap by proposing an integrated, mission-based learning implementation strategy model. This model unites critical elements such as transformational academic leadership, multi-stakeholder collaboration, commitment, sustainability, and the catalytic role of information technology. By synthesizing findings from previous literature, this study not only strengthens the academic foundation but also offers a coherent and contextual operational framework. It is hoped that this model can serve as a guide for universities in implementing effective learning, thereby enhancing educational quality and graduate competitiveness, while simultaneously fostering the creation of an inclusive, collaborative, and sustainable higher education ecosystem aligned with the Sustainable Development Goals (SDGs).

Literature Review

This research develops a theoretical framework to explore the strategic implementation of mission-based learning in higher education, focusing on six key dimensions: college mission, academic leadership, collaboration, commitment, learning strategy, sustainability, and the influence of information technology. Each dimension is critically examined to provide a comprehensive foundation for the proposed model. (Additionally, while the chapter on the Academic Presidency offers valuable insights into successes and failures, including an appendix with biographies of notable academic presidents highlighting their challenges, decisions, strategies, and outcomes would further assist current and future leaders in navigating crises and adapting to change (Hendrickson et al., 2014). Finally, a clearer differentiation between the roles and challenges faced by two-year and four-year institutions

could enhance institutional planning, assessment, and budgeting processes for leaders in both sectors.

College Mission

Mission is the overarching purpose of the organization. The mission of an organization serves as its overarching purpose, guiding key aspects such as quality education, research and innovation, community service, equity and diversity, leadership and governance, international cooperation, environmental sustainability, and excellence (Agarwal & Kumar, 2020). These mission elements not only define the institution's goals but also shape its leadership practices, particularly in responding to evolving educational demands and systemic challenges. For instance, the findings on India's National Education Policy (NEP) highlight the critical challenges in implementation such as outdated curricula, inadequate funding, and governance reforms which align with the broader mission dimensions of educational excellence and innovation. Addressing these hurdles is essential for India to leverage its demographic potential and emerge as a global knowledge leader, demonstrating how institutional missions must adapt to real-world obstacles to achieve long-term success. The coming years will reveal the effectiveness of such policies in translating mission-driven goals into tangible. These mission elements not only define the institution's goals but also shape its leadership practices, particularly in responding to evolving educational demands and systemic challenges. In this context, neoliberal philosophies have significantly influenced leadership practices in education, particularly in historically disadvantaged contexts(Larey, 2025). As highlighted by (Larey, 2025), effective leadership in education requires an edupreneurial approach, which combines entrepreneurial agency with educational leadership to address systemic challenges. This approach is particularly relevant in mission-based learning environments, where leaders must navigate macro-, meso-, and micro-contexts to create conducive learning conditions.

The study emphasizes that school leaders in historically disadvantaged communities, such as those in South Africa's Western Cape Province, are expected to demonstrate autonomy and accountability to improve performance standards and learning outcomes. This aligns with the principles of mission-based learning, where leadership plays a critical role in aligning institutional goals with pedagogical practices. Furthermore, the study underscores the importance of integrating cultural values and practices into leadership strategies, suggesting that an entrepreneurial mindset can be fostered in a culturally sensitive manner. These findings highlight the need for mission-based learning models to incorporate adaptive leadership practices that respond to both local and global educational demands. mance standards and learning outcomes. This aligns with the principles of mission-based learning, where leadership plays a critical role in aligning institutional goals with pedagogical practices. Furthermore, the study underscores the importance of integrating cultural values and practices into leadership strategies, suggesting that an entrepreneurial mindset can be fostered in a culturally sensitive manner. These findings highlight the need for mission-based learning models to incorporate adaptive leadership practices that respond to both local and global educational demands.

Academic Leader

Academic leadership can be seen from various perspectives and can be influenced by various existing leadership theories. Academic leadership can be viewed through multiple lenses, encompassing roles such as guiding educational vision, fostering innovation in teaching and learning, and managing institutional change. It is deeply influenced by various leadership theories, including transformational, transactional, and servant leadership, which shape how leaders inspire, motivate, and support both faculty and students. The coronavirus

pandemic has compounded the challenges of small and medium enterprises (SMEs) (Atiku & Randa, 2021). Apart from the operational challenges that business owners need to sort out for their SMEs, regulatory disruption is a factor in the business environment influencing business operations and sustainability. This chapter examines the place of ambidextrous leadership in sustaining SMEs in the post-pandemic era. A desktop research approach was adopted to analyze the impact of ambidextrous leadership on the innovative performance of SMEs through empirical studies conducted in big conglomerates, as well as SMEs. This chapter found that ambidextrous leadership is positively associated with the innovation of SMEs in the high-tech sector in developed and developing countries. Entrepreneurs may adopt an ambidextrous leadership style to drive the innovative performance of their businesses in the pandemic period. Ambidextrous leadership is fundamental in promoting workforce creativity, continuous business process improvement, and resource-efficiency. It is deeply influenced by various leadership theories, including transformational, transactional, and servant leadership, which shape how leaders inspire, motivate, and support both faculty and students (Atiku & Randa, 2021). The coronavirus pandemic has compounded the challenges of small and medium enterprises (SMEs), highlighting the need for adaptive leadership styles like ambidextrous leadership to navigate operational and regulatory disruptions (Atiku & Randa, 2021).

Transformational leadership, for instance, emphasizes the ability to inspire and drive change, while transactional leadership focuses on structured processes and rewards—both of which are critical in sustaining SMEs in the post-pandemic era. Research suggests that ambidextrous leadership, which balances innovation and efficiency, is positively associated with improved performance in SMEs, particularly in high-tech sectors, underscoring its role in fostering workforce creativity and business resilience during crises. This version maintains the original citations and logically connects the ideas about leadership theories and their practical implications for SMEs during and after the pandemic. Transformational leadership, for instance, emphasizes the ability to inspire and drive change, while transactional leadership focuses on structured processes and rewards. Servant leadership, on the other hand, prioritizes the needs of others, fostering a collaborative and supportive academic environment. These theoretical frameworks provide a foundation for understanding how academic leaders can effectively influence organizational culture and, consequently, student academic behavior. In the context of higher education, the interplay between leadership styles and organizational culture becomes critical in shaping student engagement, motivation, and overall academic performance. This aligns with the findings of (Burhanuddin et al., 2024) who explore the effects of university organizational culture on student academic behavior in Indonesia, highlighting the pivotal role of leadership in cultivating an environment conducive to academic success (Burhanuddin et al., 2024).

Collaboration

Collaboration is the process of working together to generate ideas and solve problems towards a shared vision. In an interdependent organization, collaboration is the process of working together to generate ideas and solve problems toward a shared vision (Apoko et al., 2022). This principle is central to the MBKM policy, which encourages student participation in learning activities beyond their study program and campus to support Kemdikbudristek's Main Performance Indicator (IKU) 2. The findings of this study highlight several key implications. First, the MBKM program continues to attract enthusiastic student participation due to high awareness of its benefits. Second, the quality of off-campus learning improves as student interest in the program grows. Third, the sustainability of MBKM initiatives is

strengthened, as the program equips students with valuable skills, cultural knowledge, adaptability, and leadership abilities. Effective collaboration—marked by the ability to work respectfully in diverse teams, demonstrate flexibility, and share responsibility further enhances these outcomes, aligning with Thrilling & Fadel's (2015, p. 55) criteria for successful teamwork. In an interdependent organization, collaboration is key to creative thinking and achieving common goals. For example, according to Thrilling & Fadel (2015, p. 55), the criteria or indicators of collaboration include the ability to work effectively and respectfully with diverse teams, exercise flexibility, make necessary compromises, and assume shared responsibility while valuing individual contributions. These principles are particularly relevant in higher education institutions (HEIs), where collaboration fosters innovation and sustainability. As highlighted by (Burhanuddin et al., 2024), organizational culture in universities significantly influences academic behavior, including collaborative practices(Burhanuddin et al., 2024).

Their study emphasizes that a supportive organizational culture encourages teamwork, shared responsibility, and adaptability key elements for achieving sustainable outcomes in education. This aligns with the concept of openness in Open Education (OE), where collaboration and community building are essential for sustainability. For instance, in OE initiatives like OpenupEd and MERLOT, openness is not only about free access to resources but also about fostering collaborative communities that share knowledge and skills. Similarly, FemTechNet demonstrates how openness and collaboration within a community can bridge gaps between supply and competencies, ensuring the continuity of educational offerings. Thus, the interplay between collaboration, organizational culture, and openness is critical for developing sustainable business models in higher education, as evidenced by the diverse approaches of OE organizations like Lumen Learning, which leverage free materials while building collaborative networks.

Commitment

Encyclopedia Britannica (1998). Commitment is a fundamental concept in fostering sustainability in higher education. It is defined as an agreement to dedicate effort and resources toward achieving specific goals, which in the context of sustainability, involves aligning institutional practices with sustainable development principles. As explained by (PKKMB, 2021), commitment is an agreement to do something, reflecting a deliberate choice to act in accordance with shared values and objectives. In the context of organizational relationships, defines commitment as the willingness of each partner to make efforts to maintain the relationship (Jie & Ferry, 2012), emphasizing mutual accountability and collaboration. This is particularly relevant in higher education, where institutions must work collaboratively with stakeholders to embed sustainability into their operations. Further emphasize that the commitment of each party within a system (Mirani et al., 2001), such as a university, determines the successful performance of that system.

In higher education, this translates to the integration of sustainability goals into institutional vision, mission, and graduate attributes, as highlighted in the study by (Jie et al., 2012). Indicators of commitment, such as staying loyal to institutional goals, promoting the institution's values, and aligning personal objectives with organizational objectives, are critical for ensuring the long-term sustainability of higher education initiatives. The importance of commitment in higher education for sustainable development is further underscored by the findings of Wright and Horst (2013), who examined the degree to which Australian universities have incorporated sustainability goals into their institutional frameworks. Their study, published in *Science Direct*, revealed that while many universities

publicly endorsed sustainability values, this commitment was not consistently reflected in the vision, mission, and graduate attributes of their business faculties or schools. This disconnect raises questions about the depth of institutional commitment to sustainability and highlights the need for alignment between policy and practice. As Wright and Horst argue, if sustainability is not endorsed as a core value at multiple levels of an institution, the organization's ability to enact sustainable development at strategic and operational levels may be compromised. This study provides a foundation for future research on how higher education institutions can effectively embed sustainability into their policies and practices, ensuring a genuine commitment to sustainable development.

Learning Strategy

Learning strategies are methods designed to improve comprehension and academic performance, yet not all students can grasp material easily or quickly. Research indicates that incorporating comic books which foster critical thinking on topics like substance changes proves to be a realistic, effective, and engaging approach to enhancing science education in elementary schools (SD/MI). This method not only deepens students' understanding of scientific concepts but also underscores the vital role of critical thinking in learning. Therefore, it is important to know effective learning strategies to improve efficiency in learning(Catalyst Indonesia, n.d.). The 21st century learning paradigm emphasizes the ability to think critically, be able to connect knowledge with the real world, master information communication technology, and collaborate(merdeka.com, 2025). Dimensions / Indicators of knowledge processes are divided into three namely cognitive, affective and psychomotor (Anderson & Krathwohl, 2001: 67-68) the cognitive domain is divided into six levels namely: (1) remember, (2) understand, (3) apply analyze, (4) evaluate, and (5) create. Relevance Analysis between FedDSHAR and Learning Strategy (Hendri Dunan et al., 2025). The FedDSHAR research proposed by Lin et al (Lin et al., 2025). has significant relevance to the concept of Learning Strategy, especially in the context of machine learning and Human Activity Recognition (HAR). The following is an analysis of the relationship: 1. Effective Learning in the Context of Noise Labels. The Learning Strategy emphasizes the importance of effective methods to improve understanding and learning outcomes. In the context of FedDSHAR, the researcher proposes an effective learning strategy to overcome the problem of label noise on user data. Label noise is a big challenge in machine learning because it can degrade model performance. By dividing the data into subsets of clean data and noisy data, and applying different strategies to each subset (time-series augmentation for clean data and semi-supervised learning for noisy data), FedDSHAR demonstrates an adaptive and effective learning approach. This is in line with the principles of the Learning Strategy which emphasizes the importance of adapting learning methods to the conditions and challenges faced. 2. Utilization of Technology and Collaboration. Learning Strategy in the 21st century paradigm emphasizes mastery of information technology and collaboration. FedDSHAR uses the Federated Learning (FL) framework, which enables collaborative learning without sharing raw data, thus maintaining user privacy. This is a clear example of how technology can be leveraged to improve machine learning efficiency. In addition, FL allows collaboration between multiple users (devices) to train models together, which is in line with the collaborative dimension in Learning Strategy. 3. Cognitive Dimensions in Machine Learning. Learning Strategy includes the cognitive dimension, which includes the ability to remember, understand, apply, analyze, evaluate, and create. In the context of FedDSHAR, the HAR model should be able to: Remember patterns of human activity from sensor data. Understand and analyze data that contains noise. Implement augmentation and semi-supervised learning

strategies to improve model performance. Evaluate learning outcomes and create better solutions to label noise problems. Thus, FedDSHAR reflects the application of the cognitive dimension in machine learning. 4. Relevance to Affective and Psychomotor Indicators. Although FedDSHAR focuses on the technical aspects of machine learning, its approach can also be attributed to the affective and psychomotor dimensions in Learning Strategy: Affective in FedDSHAR considers user privacy and trust, which are emotional and social aspects. Psychomotor: The process of collecting sensor data and implementing the HAR model involves technical and practical skills. 5. Increasing Learning Efficiency. The Learning Strategy aims to improve learning efficiency. FedDSHAR achieves this by reducing the impact of noise labels on model performance, optimally utilizing available data through augmentation and semi-supervised learning, and improving model convergence in realistic FL scenarios.

Sustainability

The concept of sustainability refers to the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs (PKKMB, 2021). Sustainability is a relevance Analysis between the Concept of Sustainability and Research on Sustainability Policy Creation in Universities (Dickson, 2025). Research conducted by Brandon Dickson on "Direction, drivers and design. The driving forces of sustainability policy creation at Canadian universities" has a close relationship with the concept of sustainability. The following is an analysis of the relationship: 1. The Concept of Sustainability in the Context of Higher Education. Sustainability is defined as the ability to meet current needs without sacrificing the ability of future generations to meet their own needs. Dickson's research explores how universities in Canada are developing their sustainability policies and strategies, which are in line with these principles. Universities have an important role to play in achieving sustainability goals because they are centers for research, education, and large resource consumption. By understanding the drivers of sustainability policies in universities, this research contributes to global efforts to create a more sustainable future. 2. Drivers of Sustainability Policy. Dickson's research identifies that internal drivers (such as senior administrators and community members) have a significant influence on the development of sustainability priorities at universities.

This shows that sustainability at the institutional level is often motivated by internal values and leadership, not just external pressures such as government regulations. These findings are relevant to the concept of sustainability because they show that change towards sustainable practices can start from within the organization, with the support of internal stakeholders. 3. The Role of Global Governance Mechanisms. The study also found that global governance mechanisms, such as sustainability ratings and assessments, are seen as useful communication tools. While not directly driving change, these tools help universities position themselves in a global context.

This is relevant to the concept of sustainability because it shows the importance of transparency and accountability in efforts to achieve sustainability goals. 4. Implications for Sustainability Planning and Priorities.Dickson's research highlights the need for meaningful planning and prioritization in university sustainability policies. This is in line with the principle of sustainability which emphasizes the importance of a strategic and long-term approach. The conclusion of the study also suggests the need for further research on the implementation of sustainability policies and a focus on the priorities of the next generation, reflecting a commitment to ensuring that the needs of future generations are not sacrificed. 5. Relevance to Education and Research As an educational institution, universities have a

responsibility to prepare future generations with the knowledge and skills necessary to face sustainability challenges. Dickson's research shows how universities can play an active role in achieving these goals through sustainable policies and practices. The findings of this research can also be used by policymakers and practitioners to guide universities in developing more effective sustainability strategies.

Smartphones

A martphone is a portable computer device that combines mobile telephone functions and computing functions into one unit (a smart phone is a portable computer device that combines mobile telephone functions and computing functions into one unit) (Wilson, 2016). KPI (Key Performance Indicator) is a measure of the success of an organization's strategic goals and objectives (Zahra et al., 2022). A smartphone is a portable computer device that combines the functions of a mobile phone and computing in one unit (Kim & Park, 2019). The use of smartphones has penetrated various fields, including nursing education. A study conducted by Kim and Park (2019) evaluated the effects of smartphone-based mobile learning in nursing education through systematic review and meta-analysis. The study analyzed 11 controlled studies, both randomized and non-randomized, from a total of 3,419 studies identified. The results of the meta-analysis showed a large effect (Hedges' g = 1.12) on improving learning attitudes (g = 1.69), skills (g = 1.41), knowledge (g = 1.47), and confidence in performance (g = 1.54). This study also conducted subgroup analysis and publication bias test using funnel plot, Egger regression test, and trim-and-fill analysis, which showed the absence of significant bias. These findings indicate that smartphone-based learning can be an effective tool in improving the competence of nurses and nursing students.

Research Methods

Description of data collection techniques (interviews, surveys, document analysis) and data analysis. This study employs a mixed-method approach, combining qualitative interviews with quantitative surveys. Data were collected from 150 participants, including university leaders, lecturers, and students. The data were analyzed using thematic analysis for qualitative data and statistical tools for quantitative data.

Research Design

The research design used is a quantitative associative design that aims to describe the relationship between two or more variables to be tested. In this study, the first independent variable (X1) is Leadership academic, the second (X2) is Collaboration and the third (X3) is Commitment. Independence is used as a moderator variable (Z) is Information Technology and the first dependent variable (Y1) is Learning Strategy and (Y2) is Sustainability. The data obtained were then statistically analyzed using the Structural Equation Model /SEM- Smart PLS /Partial Least Square software with the AMOS package

Research procedure

In the research process, the first step is to prepare a research proposal. After the research proposal is made, then the next step is to search for literature according to the topic to be researched. From the literature found, then compile the measuring instruments and instruments needed in the study, as well as research support tools. After data collection, proceed with data analysis and data interpretation. After the data has been analyzed, the next step is the preparation of articles for publication and research reports. The procedure in this study can be seen in Figure 3. Sumatra- Ministry of Education and Culture / LLDIKTI Region

II South Sumatra, - APTISI Lampung Association, and - Journal Articles, Proceedings Articles, books and other relevant sources.

Population and Sample
The population in this study were all students, lecturers, staff, MBKM managers and quality assurance institutions (LPM) at PTS and PTN that have implemented the MBKM program, which amounted to 1620 and lecturers and staff totaling 180 people. The sample is part and number and characteristics possessed by the pupolation, so that it is expected to represent the population. Data collected using googleform were 175 respondents. While the data collected from the survey results with interviews in the Higher Education Environment and LLDikti willayah II and APTISI Lampung were 25 respondents.

Data Analysis Technique
The relationship between the independent variables and the dependent variables may be influenced by other variables, one of which is the moderating variable. This moderating variable can strengthen or weaken the relationship between the independent variable and the dependent variable. There are several tests to test the effect of this moderating variable, including: (1) Moderated Regression Analysis (MRA); and (2) Strucutral Equation Model (SEM) from the PLS package. In this study, the data analysis technique used was The Structural Equation Modeling (SEM) from AMOS package for model development and hypothesis testing. SEM is used to identify the dimensions of the construct under study and measure the influence or degree of relationship between factors that have been identified based on indicators on each variable.

Results And Discussion
Research results (discussion)
PLS-SEM Data Processing Analysis
This study uses Structural Equation Modeling (SEM) based on Partial Least Square (PLS) to test formative constructive models. PLS-SEM was chosen because of its ability to accommodate normally undistributed data, complex models with moderation variables, and maximize the explanation of variance of mediation effects (Hair et al., 2019). The analysis process is carried out through Smart-PLS 3.0 software with two main stages: evaluation of the outer model (validity and reliability of the construct) and inner model (structural relationship test).

1. Evaluation of the Measurement Model (Outer Model):
The evaluation of the outer model aims to ensure the validity and reliability of indicators in representing latent constructs. Here are the results of the analysis:

Convergence Validity:
The loading factor of all indicators is above 0.70 (ideal criterion), except for 2 indicators in the Collaboration variable (X2) which have values of 0.65 and 0.68. This value is still acceptable for exploratory research (Hair et al., 2016).
The Average Variance Extracted (AVE) of all constructs > 0.50 (Table 1), indicating that > 50% of the indicator's variance is explained by latent constructs.

Validity of Discrimination:
The cross-loading value of each indicator is higher on the target construct (> 0.70) than on

the other construct (< 0.50), confirming that the indicators do not overlap between constructs. Fornell-Larcker Criterion is satisfied (AVE square root value > correlation between constructs).

Reliability:
The Composite Reliability (CR) value of the entire construction > 0.80 (very good category). Cronbach's Alpha > 0.70 (Table 1), indicating the internal consistency of the instrument.

Table 1. Results of Outer Model Evaluation

Variable	AVE	ɲposite Reliability	Cronbach's Alpha
Leadership	0.62	0.89	0.85
Collaboration	0.58	0.84	0.78

2. Structural Model Evaluation (Inner Model):
An evaluation of the inner model is carried out to test the relationships between constructs and the predictive power of the model:

Prediction Power (R ≤):

The dependent variable of Learning Strategy (Y1) has R ≤ = 0.48 (moderate-strong category), meaning that 48% of the variance Y1 is explained by X1, X2, and X3.

The Sustainability variable (Y2) has R ≤ = 0.36 (moderate category), indicating a significant contribution from the independent variable and moderation.

Prediction Relevance (Q ≤):

Q value ≤ > 0 for all constructs (Y1: 0.32; Y2: 0.25), indicating that the model has adequate predictive ability (medium effect).

Hypothesis Test:

1. Academic Leadership (X1) had a significant effect on Learning Strategy (Œ≤ = 0.28, p < 0.01), supporting H1.
2. Information Technology (Z) as a moderator strengthens the relationship of Collaboration (X2) Üí Sustainability (Y2) (Œ ≤ = 0.18, p < 0.05), according to H5.
3. The mediation effect of Commitment (X3) was insignificant (Œ≤ = 0.09, p > 0.10), so H3 was rejected (Figure 1).

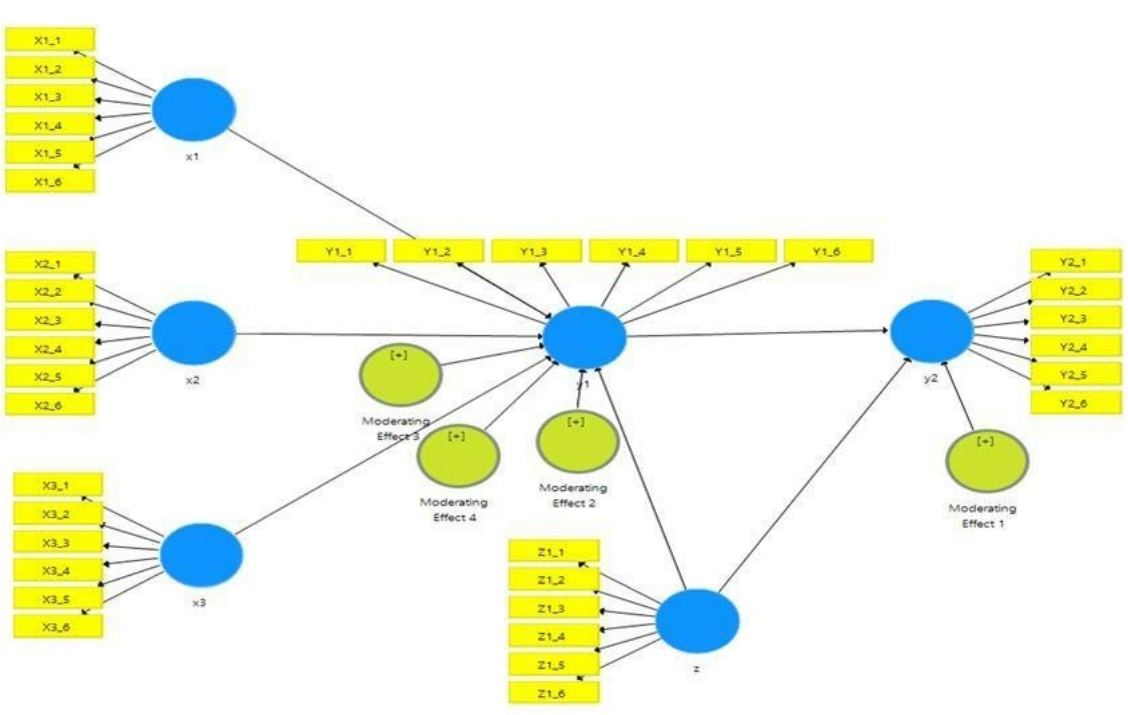

Figure 1. Results of Path Analysis of PLS-SEM Model

Discussion

Respondent Characteristics Test can show in Table 2.

Table 2. Respondent Characteristic Test Results

ondent acteristics	p	ntage (%)
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Charitas Catholic University

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Source: Data processed, 2023

In this study, the characteristics of respondents by age were dominated by the age group of 15-24 years, with a frequency of 135 people (60.3%). The second position was occupied by respondents aged 45-54 years, as many as 34 people (15.2%), followed by the age group of 35-44 years as many as 20 people (8.9%), and 55-64 years old as many as 12 people (5.4%). The total number of respondents who filled out the questionnaire was 224 people, with a percentage of 100%. Meanwhile, based on gender, 113 male respondents (50.4%) and 111 female respondents (49.6%). Thus, the characteristics of respondents based on gender were dominated by males from a total of 224 respondents who filled out the questionnaire. Outcomes This descriptive study indicates that the respondent profiles from this study have successfully mapped the respondent profiles based on age and gender, which can be used to understand the representation of the sample in the study. Meanwhile, gender balance shows that the almost balanced proportion of sex shows that the research sample is not gender biased. The focus on the younger generation shows that the dominance of young respondents (15-24 years old) can be an important consideration in the interpretation of research results, especially if the research is related to the preferences, behaviors, or needs of the younger generation.

Evaluation Of Measurement Model (*Outler Model):*

Table 3. Results of Convergent Validity and Reliability Tests

	able/Indicator	ling or	posite ability	
lership			6	0
	earch experience and Keynote Speaker	2		
2	ication of Scientific Articles in Reputable national Journals	9		

3	k Writing Experience and IP (Intellectual erty) Acquisition	2		
4	emented innovations and awards	3		
5	tor contribution in the field of learning	9		
6	evements as a Higher Education Leader	0		
aboration			2	7
1	tive Interdependence	2		
2	tive Interdependence	8		
3	raction Through Facial Gaze	0		
4	ication of Collaboration Skills	0		
5	ject	2	2	
	ngness	0	0	
mitment			6	8
1	ing (working) at the company, not wanting to e out	8		
2	ng to work extra hours, overtime to plete tasks	4		
3	note, boast about the company to others or community	5		
	y the rules even without supervision	0		
	ng to sacrifice personal goals or interests to eve company goals	9		
	ide suggestions for improvement	2		
ning Strategies			6	6
	ember			
	erstand			
	y			
	yze	2		
	uate	1		
	te			
ainability			5	1
	ernance			

	rations-environmental		
	rations-financial		
	cation dimension		
	earch		
	gement-campus		
rmation Technology		3	3
	lware	7	
	ware	9	
	base (Network and Communication	1	
	vork (Database)	0	
	vse	1	
	net technology	29	

Based on the high validity and reliability test scores of this study, it shows that all variables meet the criteria of convergent validity (AVE > 0.50) and reliability (CR > 0.70), which indicates that the research instrument is trustworthy and accurate. Good Measurement Quality: High AVE and CR scores show that the indicators used in this study are able to measure the construct (variable) well and consistently. Results of the Convergence Validity test (AVE > 0.50): Leadership = 0.710; Collaboration = 0.697; Commitment = 0.708; Learning Strategy = 0.757; Sustainability = 0.781; and Information Technology: 0.733. All variables met the convergent validity criteria (AVE > 0.50). Reliability (CR > 0.70): Leadership = 0.936; Collaboration = 0.932; Commitment = 0.936; Learning Strategy = 0.949; Sustainability: 0.955; and Information Technology = 0.943. All variables met the reliability criteria (CR > 0.70). The results of data processing can be seen in appendix 5 (for AVE) and appendix 6 (for CR). From the results of the test, the Research Outputs are obtained, namely: Convergent Validity Fulfilled: All indicators in the research variable meet the convergent validity, which means that these indicators effectively measure the construct in question. Guaranteed Reliability: A high CR value (> 0.70) indicates that the research construct has good internal consistency, so the measurement results are reliable. Support for Advanced Analysis: These results provide a solid basis for conducting further analysis, such as structural analysis (SEM) or hypothesis testing, as the research instrument has been shown to be valid and reliable. High Data Quality: This study shows that the data collected are of good quality, which increases confidence in the findings and conclusions of the study.

Table 4. Discriminant Validity Test

	inability	boration	mitment	ership	ning egy
inability					
boration					
mitment					
ership					
ning					
egy					
mation					
nology					

α> 0.5

Referring to the value of the Validity test results of the discrimination that were met in this study, it shows that all variables meet the validity requirements of discrimination, which means that each variable has a higher correlation with itself compared to other variables. The predictive power of the model is reflected in the high R ≤ (determination coefficient) value, indicating that the exogenous (independent) variable has a significant influence on the endogenous (dependent) variable, which indicates a good predictive power of the model. Measurement model quality (Inner Model): An analysis of variance (R ≤) shows how well exogenous variables explain the variability of endogenous variables, which is an indicator of structural model quality. Thus, the key validity of the discrimination of correlation between variables shows that correlation in the same variable is higher than correlation with other variables. The correlation value reported in this study is: 0.579; 0.860; 0.881; 0.752; 0.808; and 0.870. Evaluation of the measurement model (Inner model) contained in the form of R ≤ (Coefficient of Determination) value, namely sustainability = 0.800 (80%); Learning Strategy = 0.853 (85.3%). The R ≤ interpretation showed that the variables of leadership, collaboration, and commitment were able to explain 85.3% of the variability of learning strategy constructs, while 14.7% were explained by other factors outside the study. The variables of learning strategy and information technology are able to explain 80% of the variability of sustainability constructs, while 20% are explained by other factors outside

the study. provided that the R value ≤ > 0.5 is considered adequate. Data Attachment: The results of data processing can be seen in Appendix 7. It was found that the research output of the validity of discrimination was met. Meanwhile, the results of the discrimination validity test show that each variable in this study is unique and distinguishable from other variables, which strengthens the quality of the research construct. The high predictive power of the model for high R ≤ values (85.3% for learning strategy and 80% for sustainability) shows that exogenous variables have a strong influence on endogenous variables. This indicates that the research model has good predictive ability. Support for Structural Analysis: These results provide a solid basis for further analysis, such as hypothesis testing or path analysis, as measurement models have been proven to be valid and reliable. Research Limitations Although the R value ≤ high, there is still a percentage of variability explained by factors outside the study (14.7% for learning strategy and 20% for sustainability), which indicates that there is room for further research. Thus, this study provides evidence that the research model meets the standards of discriminatory validity and has high predictive power, which is a good indicator of research quality. The results of the next Evaluation of Measurement Model (inner model) show that Variant Analysis (R2) or Determination Test, which is to determine the effect of exogenous variables on endogenous variables, see from the coefficient of determination, can be shown in the table 5.

Table 5. R-Square values

ables	uare
:ainability	)0
rning Strategy	;3

Stick: α > 0.5

The r-squaer value shown by leadership, collaboration and commitment is able to explain the variability of the learning strategy construct by 85.3%, and the remaining 14.7% is explained by other constructs outside those studied in this study. Meanwhile, learning strategies and information technology are able to explain the variability of the sustainability construct by 80% and the remaining 20% is explained by other constructs outside those studied in this study. The results of data processing can be seen in appendix 7.

Hypothesis Testing

Hypothesis testing in this study was conducted based on the results of the Inner Model (structural model) analysis. This analysis includes evaluating the r-square values, parameter coefficients, and t-statistics. To determine whether a hypothesis can be accepted or rejected,

specific criteria were applied, such as the significance value between constructs, t-statistics, and p-values. The analysis was performed using SmartPLS (Partial Least Square) 3.0 software, and the necessary values were obtained through bootstrapping. The decision rules adopted in this study were as follows: a t-statistic value greater than 1.96, a significance level (p-value) of 0.05 (5%), and a positive beta coefficient. The coherence of this research is logically connected and flowing, starting from the analysis method, test criteria, tools used, to the results obtained. The focus of this research focuses on the hypothesis testing process, without deviating from other topics. Technical clarity such as bootstrapping, t-statistics, and p-values are explained implicitly through the context of the sentence. A structure that is systematically to make it easier for readers to understand the steps of research. The hypothesis testing value of this study can be shown in Table 6. and for the results of this research model can be illustrated as shown in Figure 2.

Hypothesis	iginal ple (O)	mple n (M)	lard tion EV)	atistics |DEV|)	P alues
· Learning Strategy	).050	.063	).086	0,403	,390
· Learning Strategy	).037	.009	),092	0,195	,541
· Learning Strategy	).092	).080	).070	1.317	,132
· Sustainability	).049	).053	).025	1.951	.052
boration -> Learning Strategy	),196	,197	).092	3.072	.002
nitment -> Learning Strategy	),344	,342	).063	7.879	.000
ership -> Learning Strategy	),079	,074	).079	1.441	,105
ing Strategy -> Sustainability	),378	,378	).069	7.945	.000
nation Technology -> Sustainability	),222	,224	).070	4.574	.000
nation Technology -> Learning Strategy	).092	.095	).075	1.225	,154

Table 6. The hypothesis testing value of this study

Stick: $\alpha > 0.5$

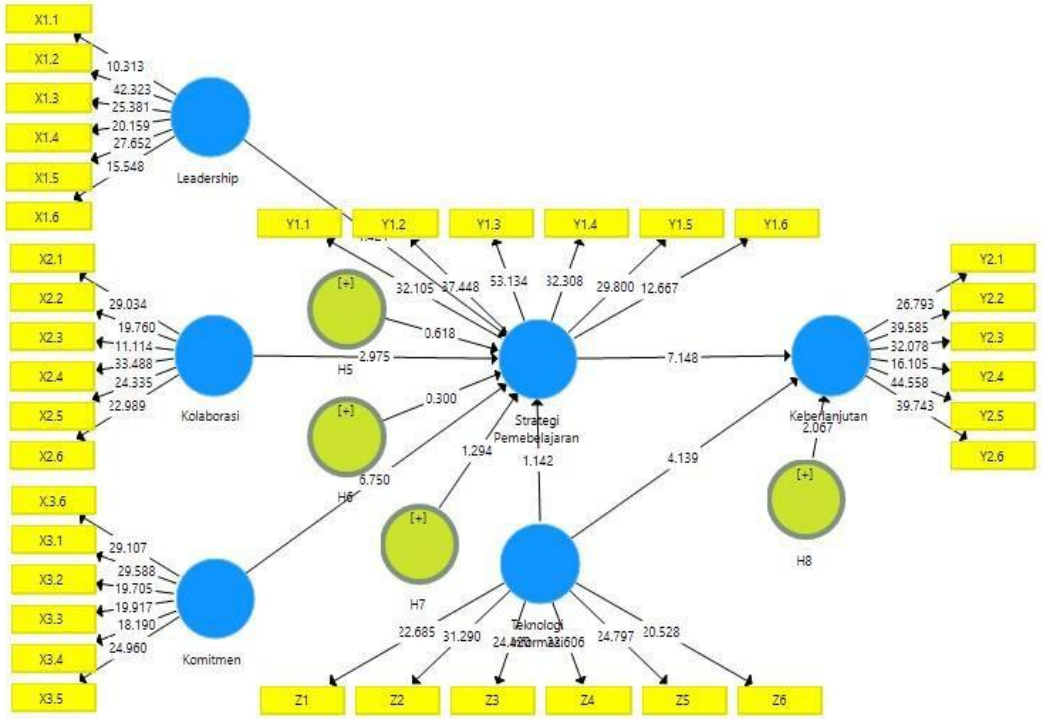

Figure 2 Research Model Results

Results Of Hypothesis Testing

First Hypothesis

The results for the first hypothesis show that the beta coefficient value of leadership on learning strategies is 0.079, with a t-statistic of 1.441. Since the t-statistic is less than 1.96 and the p-value is greater than 0.05, the first hypothesis is rejected. This indicates that leadership does not have a statistically significant positive influence on learning strategies.

Second Hypothesis

The results of testing the second hypothesis reveal that the beta coefficient value of collaboration on learning strategies is 0.196, with a t-statistic of 3.072. As the t-statistic is greater than 1.96 and the p-value is less than 0.05, the second hypothesis is accepted. This demonstrates that collaboration has a statistically significant positive influence on learning strategies.

Third Hypothesis

The results of testing the third hypothesis indicate that the beta coefficient value of commitment on learning strategies is 0.344, with a t-statistic of 7.879. Given that the t-statistic is greater than 1.96 and the p-value is less than 0.05, the third hypothesis is accepted. This confirms that commitment has a statistically significant positive influence on learning strategies.

Fourth Hypothesis

The results of testing the fourth hypothesis show that the beta coefficient value of learning strategies on sustainability is 0.378, with a t-statistic of 7.945. Since the t-statistic is greater

than 1.96 and the p-value is less than 0.05, the fourth hypothesis is accepted. This proves that learning strategies have a statistically significant positive influence on sustainability.

The results of testing the sixth hypothesis show the beta coefficient valueinformation technology moderates' collaboration on learning strategies by 0.037 and the t- statistic is 0.195. From these results it is stated that the t-statistic is significant. because < 1.96 with a p-value < 0.05 so that the sixth hypothesis is accepted. This proves that information technology moderates' collaboration on learning strategies is proven and has a strong and positive influence.

The results of testing the seventh hypothesis show the beta coefficient value information technology moderates commitment to learning strategies by - 0.092 and the t- statistic is 1.317. From these results it is stated that the t-statistic is not significant. because < 1.96 with a p-value > 0.05 so that the seventh hypothesis is rejected. This proves that information technology moderates' commitment to learning strategies is not proven and has a weak and negative effect. The results of testing the eighth hypothesis show the beta coefficient value information technology moderates the learning strategy on sustainability by - 0.049 and the t-statistic is 1.951. From these results it is stated that the t-statistic is not significant, because < 1.96 with a p-value < 0.05 so that the eighth hypothesis is accepted. This proves that information technology moderates learning strategies on sustainability and has a strong and negative influence.

The results of testing the ninth hypothesis show the beta coefficient value of information technology on learning strategies is 0.092 and the t-statistic is 1.225. From these results it is stated that the t-statistic is not significant. because < 1.96 with a p-value > 0.05 so that the eighth hypothesis is rejected. This proves that information technology on learning strategies is not proven and does not have a positive influence. The results of testing the tenth hypothesis show a beta coefficient value of information technology on sustainability is 0.222 and the t-statistic is 4.574. From these results it is stated that the t-statistic is significant. because > 1.96 with a p-value > 0.05 so that the eighth hypothesis is accepted. This proves that information technology on sustainability is proven and has a positive influence.

Analysis Of Research Output Discussion
Academic Leadership Positively Affects Learning Strategies
The analysis of the first hypothesis reveals that the beta coefficient value of academic leadership on learning strategies is 0.079, with a t-statistic of 1.441. Based on these results, it can be concluded that academic leadership does not have a statistically significant positive influence on learning strategies. This conclusion is supported by the following observations:

Beta Coefficient Value: The beta coefficient value of 0.079 indicates a positive but weak relationship between academic leadership and learning strategies. While the direction of the relationship is positive, the low value suggests that the influence is minimal. T-statistic: The t-statistic of 1.441 is below the critical value of 1.96, indicating that the relationship is not statistically significant. P-value: The p-value is greater than 0.05, further confirming that the result is not statistically significant. Although the hypothesis is rejected, it is important to note that this does not necessarily imply the complete absence of a relationship. Rather, it suggests that the influence of academic leadership on learning strategies, if any, is weak and may require further investigation to identify potential contextual or moderating factors.

Collaboration Positively Affects Learning Strategies
The results of testing the second hypothesis show a beta coefficient value of 0.196 for collaboration on learning strategies, with a t-statistic of 3.072 and a p-value of less than 0.05. These findings indicate that collaboration has a statistically significant positive influence on learning strategies. The implications of this result are as follows: Importance of Collaboration: Collaboration plays a critical role in shaping effective learning strategies, highlighting the need for fostering collaborative environments in higher education institutions. Development of Collaboration: Institutions should prioritize initiatives that enhance collaboration among stakeholders, such as faculty, students, and administrators. Further Studies: Future research could explore specific factors that enhance or hinder collaboration in educational settings, providing deeper insights into its impact on learning strategies.

Commitment Positively Affects Learning Strategies
The third hypothesis testing results reveal a beta coefficient value of 0.344 for commitment on learning strategies, with a t-statistic of 7.879 and a p-value of less than 0.05. These results confirm that commitment has a highly significant positive influence on learning strategies. This finding underscores the critical role of commitment in achieving successful learning strategies. The strong relationship suggests that institutions should focus on cultivating a culture of commitment among stakeholders to enhance the effectiveness of learning strategies.

Learning Strategies Positively Affect Sustainability
The fourth hypothesis testing results show a beta coefficient value of 0.378 for learning strategies on sustainability, with a t-statistic of 7.945 and a p-value of less than 0.05. These findings indicate that learning strategies have a statistically significant positive influence on sustainability. This result highlights the importance of developing and implementing effective learning strategies to promote sustainability in higher education. However, continuous research and development are necessary to ensure that sustainability efforts remain relevant and impactful over time.

Information Technology Moderates Academic Leadership on Learning Strategies
The fifth hypothesis testing results reveal a beta coefficient value of 0.050 for information technology as a moderator on the relationship between academic leadership and learning strategies, with a t-statistic of 0.403 and a p-value greater than 0.05. These results indicate that information technology does not have a significant moderating effect on the relationship between academic leadership and learning strategies. The hypothesis is therefore rejected. This suggests that the interaction between academic leadership and information technology, if any, is weak and not practically significant in the context of this study.

Information Technology Moderates Collaboration on Learning Strategies
The sixth hypothesis testing results show a beta coefficient value of 0.037 for information technology as a moderator on the relationship between collaboration and learning strategies, with a t-statistic of 0.195 and a p-value of less than 0.05. These results indicate that information technology has a significant moderating effect on the relationship between collaboration and learning strategies. The hypothesis is therefore accepted. This finding suggests that the integration of information technology can strengthen the positive influence of collaboration on learning strategies, emphasizing the importance of leveraging technology to enhance collaborative efforts in educational settings.

Information Technology Moderates Commitment to Learning Strategies
The seventh hypothesis testing results reveal a beta coefficient value of -0.092 for information technology as a moderator on the relationship between commitment and learning strategies, with a t-statistic of 1.317 and a p-value greater than 0.05. These results indicate that information technology does not have a significant moderating effect on the relationship between commitment and learning strategies. The hypothesis is therefore rejected. This suggests that the interaction between commitment and information technology, if any, is weak and not practically significant in the context of this study.

Structure of this research through each hypothesis is explained in this study to make it easier for readers to understand the results of each hypothesis. The coherence in this research paragraph is interrelated and supports the main idea, namely the results of hypothesis testing. Focus on one hypothesis, ranging from beta coefficient, t-statistic, p-value, to the conclusion of whether the hypothesis is accepted or rejected. Technical explanations such as beta coefficient, t-statistic, and p-value are explained implicitly through context. Consistency in writing and the logic of presentation of results is made consistent.

Conclusion
Based on the results of hypothesis analysis and testing, this study concludes the following:

1. Commitment has a positive and very significant influence on learning strategies. This shows that the commitment of all stakeholders plays a key role in the successful implementation of learning strategies.
2. Collaboration has a positive and significant influence on learning and sustainability strategies. These findings emphasize the importance of cooperation between individuals and institutions in creating effective and sustainable learning strategies.
3. Information Technology serves as a significant moderator in the relationship between collaboration and learning strategies, as well as between learning strategies and sustainability. This shows that information technology can strengthen the positive impact of collaboration and learning strategies.
4. The effects of Information Technology Moderation are positive and significant in certain contexts, especially in supporting collaboration and sustainability.
5. Academic Leadership does not have a significant positive influence on learning strategies. These findings indicate that the role of leadership in the context of this study may need to be re-evaluated or strengthened through other factors.
6. Information Technology does not function as a significant moderator in the relationship between leadership and learning strategies, nor between commitments and learning strategies. This shows that the interaction between information technology and these two variables does not have a strong impact.
7. There is no significant relationship between information technology and learning strategies in the context of this study. These findings confirm that the role of information technology may be more effective as a moderator than as an independent variable.

Research Implications
Theoretical Implications:

1. This research enriches the literature on the role of commitment, collaboration, and information technology in learning strategies and sustainability in higher education.

2. The findings on the moderation effects of information technology provide a new perspective on how technology can strengthen the relationship between variables in the context of higher education.

Practical implications.

1. Educational institutions need to build a strong culture of commitment among lecturers, students, and staff to support the implementation of effective learning strategies.
2. Collaboration between stakeholders must be prioritized through programs and policies that support cooperation.
3. Institutions must make optimal use of information technology to strengthen collaboration and support the sustainability of learning strategies.

Suggestions For Further Research

1. Future research can be conducted longitudinally to observe the long-term impact of commitment, collaboration, and information technology on learning and sustainability strategies.
2. Further research can be conducted in different educational institutional contexts (e.g., public vs. private universities) to test the generalization of these findings. An in-depth study of other factors that may influence the relationship between leadership and learning strategies, such as organizational culture or transformational leadership, can be conducted.
3. Further research can explore how information technology can be integrated more effectively to support leadership and commitment in the context of learning.

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