

THE INFLUENCE OF TECHNOLOGY LEADERSHIP ON UNIVERSITY LECTURERS INTEGRATING TECHNOLOGY IN THAILAND

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Abstract: *This research aimed to examine the impact of technological leadership on the adoption and integration of technology by university lecturers in Thailand. The sample for this study comprised 317 university administrators and lecturers under the Ministry of Higher Education, Science, Research and Innovation who were divided into strata based on the size of their institutions. A questionnaire was used as a research instrument for data collection, while mean, standard deviation, and simple regression analysis were the statistical measures used in data analysis. Firstly, it was found that technology leadership of university administrators and the integration of technology by university professors were at a high level in all aspects. Secondly, technology leadership was found to have a .66 level of influence on the integration of technology by university professors, with all aspects showing a statistically significant correlation at the 0.05 level.*

Keywords: *technology leadership, technology integration, universities in Thailand, blended learning.*



INTRODUCTION

The world has been changing rapidly in the 21st century as it is an era of globalization with accelerated progress in information technology. Faced with new challenging problems, humans have seen the infinite value of education and realized the need to adapt to lead a better life in the new century (Tissana Khammanee, 2018). The rapid transitions of the 21st century, or the Digital Age, have developed the dual nature of the human world. There is the traditional world with human-to-human interactions and the virtual world where communication takes place on social media. Such societal changes create a challenge for education management, leading to its transformations, for example, the creation of intelligent education systems. To keep up with the Digital Age, changes to educational processes; information technology plays a crucial role in these adjustments (Mat Rahimi Yusof et al., 2023). This is because technology can increase the efficiency of management and learning, leading to improvements in education management.

Technology is a significant catalyst that has led to several educational reforms. After the promulgation of the National Education Standards B.E. 2561 - the National Strategy for Teaching and Learning, a follow-up evaluation showed that Thai children did not have adequate "3R8C" or skills desirable in the 21st century. It was also found that management teaching was inconsistent with the standards and did not focus on children's performance. This underscored a significant issue with the curriculum and teachers, showing the need for adjustment in both teaching and attitudes. The latter must be more performance-driven to make an actual starting point for a successful educational reform (Asghar et al., 2022). In addition to considering students' individual goals and serving as a learning partner to guide and inspire them, teachers in the Digital Age must be able to integrate technology into their learning management strategies effectively. It is done so that students can reach their full potential and teachers can respond more effectively to the individual differences of their students. This is because technology makes learning more accessible, allowing students to learn more quickly and broadly (Sukanya Chamchoy, 2018). Recognizing the importance of using media and information technology in education management to help improve student quality, the Ministry of Education has since mandated an information technology and education master plan. The primary goal is to train people to use information and communication technology creatively while maintaining good governance and morality. There is also a focus on providing knowledge and competency in the development and application of information technology to teachers and other educational personnel (Areerachakul, 2015). It was found that educational institutions lacked solid information systems and did not provide adequate training to ensure that administrators had basic knowledge or understanding regarding using information and communications technology in education management and services. This highlights the importance of appropriate information and communications systems and administrative personnel development for educational institutions to understand the importance of information and communications technology in education management and service. As some teachers are still unprepared to integrate technology into the classroom, it is critical to encourage teachers to expand their knowledge and skills in developing innovative lessons and learning media using information and communication technology. Furthermore, there is a lack of support from high-level administrators in pushing for the integration of technology in educational institutions. This could lead to failure before it even starts, as the trust of high-level administrators is a

critical starting point for the successful integration of information technology in educational institutions (Nguyen et al., 2023).

As a result, technology leadership has become an essential skill in today's world, especially with the accelerated growth of technology and its closer proximity to educational personnel in various departments ranging from teaching to support personnel. This change impacts administrators' leadership since they are obliged to understand these new conditions better. This is consistent with (Hu et al., 2023). that new-generation leaders must understand the significance of both current and future technologies. As a result, modern leaders must be able to use technology to maximize the development of humans and other resources. This is consistent with the Center for Advanced Study of Technology Leadership Development Technology Leadership in Education (CASTLE), which created a technology leadership framework. Technology leadership is essential for education administrators as it encourages stakeholders to participate in vision development for the broader use of technology. It motivates the use of technology in learning and the acquisition of appropriate technological knowledge to raise the level of education following curriculum standards and attain the highest levels of student achievement (Staniulienė & Lavickaitė, 2022). Technology has the potential to improve education significantly, and education administrators must be aware of its benefits. Teachers must prioritize and maintain a positive attitude toward technology and its educational applications to use it effectively. Educators must believe integrating technology into their classroom learning and instruction will benefit their students.

Given the issues raised above and the need for technological change in the Digital Age, education administrators must focus more on technology leadership. As a result, the researcher was intrigued by the levels of influence of technology leadership on technology integration by university lecturers in Thailand and their attitudes toward technology application in universities. The research instrument used in this study was explicitly developed following CASTLE's conceptual framework for technology leadership. The findings of this study could be used to develop technology leadership in education administrators to improve learning development, technology integration, and university educators' attitudes toward using technology in 21st-century learning development.

The author is now intrigued by the extent of influence that technology leadership has on the application of technology in teaching and learning, as well as on the attitudes of stakeholders associated with higher education institutions towards using technology. This curiosity forms the basis of the research objectives, which is to examine the impact of technological leadership on the adoption and integration of technology by university lecturers in Thailand.

Technology leadership and its effects on the integration of technology in educational institutions

In the literature review "technology leadership" in educational institutions is defined as the ability of educational administrators to use technology for effective management and vision creation, as well as to promote and support the use of technology in the integration of student-centered education (Huang et al., 2022). Technology leaders must be able to manage with a focus on universality and learn technology continuously to improve themselves and others and effectively achieve their goals. Furthermore, they must keep up with changes in the Digital Age

world in the following areas: (1) leadership and vision, (2) teaching and learning, (3) productivity and professional skills, (4) support, administration, and operations, (5) measurement and evaluation, and (6) social, legal, and ethical issues. As a consequence, these aspects are used as the conceptual framework for this study and are explained below.

(2.1) "Leadership and vision" refers to the administration that motivates all parties to share a common vision in integrating technology to promote learning and create an environment conducive to vision awareness. (2.2) "Teaching and learning" (Alshareef & Tunio, 2022). refers to the administration that can elevate teaching and learning to meet curriculum standards and facilitate learning with a variety of technologies. This includes the ability to explain the characteristics of teaching and learning and to use technology that meets the needs of learners. (2.3) "Productivity and professional skills" refers to the administration that focuses on using technology in daily routine by ensuring continuous practice and building teams and learning groups in the organization to use technology in improving work and increasing productivity. It includes creating professional development opportunities for those who use or act as role models in technology integration (Bunjak & Černe, 2022). "Support, administration, and operations" refers to the administration that supports, promotes, and stimulates the demand for academic productivity resulting from the use of technology. They must also ensure the sustainability of such demand by encouraging teachers to use technology in the classroom or persuading unwilling or reluctant teachers to use information technology. (2.5) "Measurement and evaluation" refers to the administration capable of using technology for data collection, interpretation, and analysis, as well as for measuring and evaluating student learning outcomes. They should also be able to use technology to effectively and objectively analyze and evaluate an institution's administrative system. (2.6) "Social, legal, and ethical issues" refers to the administration with knowledge of social, legal, and ethical concerns. This includes ensuring that students use technology responsibly and safely and having adequate knowledge of intellectual property and copyright law.

According to a shared theme in Laufer et al., (2021). *Leadership Perspectives on EdTech in a COVID-19 Reality— A Divider or Bridge Builder?* this report elaborates how educational administrators are increasingly embracing internet-based studies to expand access, study and alliance. In response to the COVID-19 pandemic, the education system suddenly had to tilt towards online teaching. In response to this rapid shift toward digital technologies, 85 leaders from higher education institutions in 24 countries worked to overcome the digital divide. They focused on closing access gaps by increasing budgets for comprehensive online teaching across an entire system including not only the expense of electronic publishing and Web development, but also setting policy directions to hasten and guide the continual rapid transformation of digital technology.

Küçük, (2023). investigated of how technological instruction affects higher education, with particular attention given not only to its positive aspects but also its negative side. The study found that technology has become a major part of the modern world and exerted a great influence on higher education. This called for more thought, research, and experiment. The findings showed that the implementation of technology greatly affects the processes both of teaching and learning for faculty. It was found that if ICT is introduced into education then all three parties will benefit greatly, while at the same time either the permanence or stretching out over time for what has been acknowledged is guaranteed.

In a paper entitled "Transformational leadership and digital skills in HEIs During the COVID-19 Pandemic," research by Antonopoulou et al., (2021). revealed after 1-2 years, the entire world battled invasive COVID-19 pandemic, which affected so many different aspects of life. The study shows how leaders in educational change have adopted technology. It highlights that the whole process of learning and teaching, including testing media for effectiveness, is inextricably linked with the efficiency of teachers and learners both. Moreover, having a vision for teaching media equipment and support enhances teacher, student, staff and parent satisfaction among all stakeholders. This finding underscores the increasing need to integrate more digital technology into educational settings.

It is consistent with the findings of Nguyen et al., (2023). who investigated the characteristics of electronic leadership and the factors influencing the effectiveness of electronic leadership among elementary school administrators. The study discovered that integrating information technology into the curriculum, teaching, and learning, as well as teacher professional development, had a statistically significant impact on the effectiveness of electronic leadership for administrators at the .05 and .01 levels. The support of the school's board members and community was found to have a statistically significant influence on the school administrators' electronic leadership effectiveness at the .05 level. This is consistent with Mihardjo et al., (2019). findings on the level of technology leadership influencing the administration of basic education school administrators in Thailand's south. The study discovered that factors in professional development in technology, visions in technology, technology integration, and technology skills all significantly influenced educational administration, either directly or indirectly. This is consistent with the findings of Soni et al., (2023). who explored the effects of school administrators' technology leadership on the school environment. The study also examined the use of teachers' technology integration in indicating the effectiveness of teachers in top secondary schools under the Office of the Basic Education Commission at the sub-district level. It found that the technology leadership of administrators in top secondary schools at the sub-district level had a direct influence on teacher effectiveness, while the school environment had an indirect effect on teacher effectiveness through technology knowledge and integration. This study's model corresponded to the theoretical framework and could be used to explain 83% of teacher effectiveness. Islam et al., (2022). investigated the relationship between technology leadership and academic administration of school administrators under the Office of Non-formal Education and Informal Education in Saraburi Province, Thailand, in another study. The findings revealed that school administrators' technology leadership was highly correlated with their academic administration, with statistical significance at the .01 level.

Concepts and theories about the integration of technology use among educational personnel

According to the literature review, "technology integration by educational personnel" refers to the process of teaching and learning in which educators choose appropriate educational media and technology. Numerous media types for teaching and learning are available today, necessitating teachers' considerable skills in integrating technology into promoting and developing knowledge. It also requires teachers to be able to transform content into methods, processes, or practices used in learning activities, such as the use of educational technology,

computers, multimedia media, the Internet, etc. (Duncan et al., 2022). The integration of technology by academic personnel could be divided into the following aspects

1. Integration with content knowledge refers to the ability to integrate technology into the content of subjects such as Thai language, Mathematics, Science, Social Studies, Religion and Culture, Health and Physical Education, Arts, Career and Technology, and foreign languages. This includes integrating perspectives, theories, concepts, evidence, and various theory tests, implementing them in practice, and further developing that body of knowledge. To accomplish this, teachers must have a good understanding of the subject's content to explain complex topics in an easy-to-understand manner and have the knowledge needed to study advanced content on their own (Lok et al., 2022).

2. Integration with pedagogical knowledge refers to integrating technology into the curriculum and the teaching and learning process. This includes the ability to conduct teaching and learning to achieve educational objectives. The focus of this integration is on student learning, lesson planning, class management, lesson plan development, putting the lesson plan into practice, assessment of student learning, and techniques, methods, or strategies for transferring in-class knowledge from teachers to enable learners to learn.

3. Integration with technological knowledge refers to the ability to integrate technology into work operations using technological knowledge of various approaches and solutions required in solving technology-related technical problems. This requires being up-to-date with new or valuable technologies, as well as possible applications of technology as a modern teaching and learning tool.

4. Integration with technological pedagogical content knowledge refers to integrating technology with lesson content and teaching methods using technological knowledge. This translates to using technology to design teaching per the nature of the subject while also ensuring an environment conducive to student learning. It includes choosing in-class technology to enhance the lesson, teaching approach, and student learning. It requires the appropriate use of technology to integrate with teaching methods and lesson content to facilitate learning management according to learning objectives (Tlemsani, 2022).

According to Ali, W. (2020). and his study 'Online and Remote Learning in Higher Education Institutes: A Necessity in Light of the COVID-19 Pandemic,' has not forgotten that amidst the spread of COVID-19, numerous higher education institutions worldwide have had to close down their campuses for long periods, seriously affecting student learning. Consequently, educational administrators not only have to make technology part of the teaching process, they must in doing so also foster flexibility and adaptability for students. The trend of universities moving towards online learning or E-Learning is clear from this study too. They also find that it plays a critical role for motivation in using technology better for learning, suggesting that teachers and staff at universities should utilize technology and technological devices to improve people's learning experiences. The study argues that the ability for online and distance learning is essential. and not only during lockdowns and times of social distancing compelled by the COVID-19 pandemic, but also in preparing for any future scenarios.

This is consistent with (Rybnikova et al., 2022). assertion that teachers' technology integration consists of three components: (1) teachers' computer proficiency, (2) teachers' belief, and (3) teachers' readiness. According to Koehler and Mishra, (2009). teachers' technology integration is based on the TPACK framework, later renamed TPACK, to communicate what teachers need to know to integrate technology efficiently. (1) Content

Knowledge (CK), (2) Pedagogical Knowledge (PK), (3) Technological Knowledge (TK), (4) Pedagogical Content Knowledge (PCK), (5) Technological Content Knowledge (TCK), (6) Technological Pedagogical Knowledge (TPK), and (7) Technological Pedagogical Content Knowledge (TPACK).

Chwen-Li, (2022). stated that the technology integration of teachers consists of 7 factors: (1) age, (2) teaching experience, (3) computer proficiency, (4) computer readiness, (5) teachers' beliefs, (6) teacher readiness, and (7) support. Inan and Lowther, (2010) stated that teacher technology integration involves 5 factors: (1) years of teaching, (2) technical support, (3) teachers' beliefs, (4) teachers' readiness, and (5) computer proficiency. (Ibrahim et al., 2022); stated that teachers' integration of technology consists of 4 components: (1) computing technology, (2) data-based technology, (3) telecommunication technology, and (4) educational technology. Mittal et al. (2022). stated that teachers' technology integration involves 3 components which are their (1) belief in technology, (2) support for technology usage, and (3) technology readiness. This is consistent with Amoako et al, (2022). who stated that teachers' integration technology consists of 3 components. (1) Computing technology includes generated commands or a set of "programs" that are created to complete tasks, such as information preparation, calculation, and online businesses. (2) Data-based technology is a source of data stored in digital codes developed parallel to computer technology. This is because computer technology is of little use without information or programs that can be stored and retrieved quickly in sufficient quantities to meet users' needs. Lastly, (3) telecommunication technology or technology for communications plays a role in linking various information through operating systems to provide more convenience.

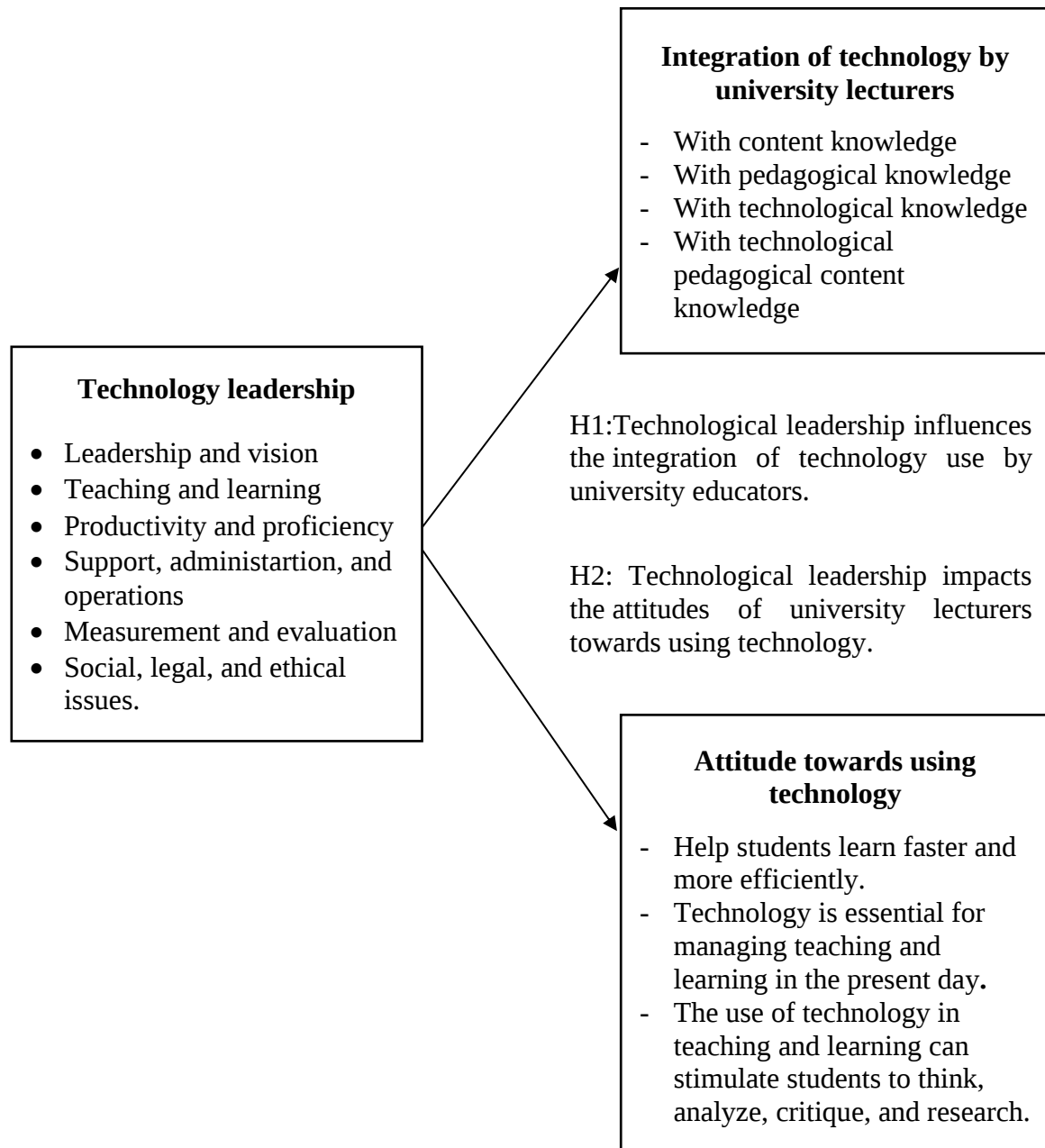
The author is now intrigued by the extent of influence that technology leadership has on the application of technology in teaching and learning, as well as on the attitudes of stakeholders associated with higher education institutions towards using technology. This curiosity forms the basis of the research objectives, which is to examine the impact of technological leadership on the adoption and integration of technology by university lecturers in Thailand. The research hypotheses include: H1. Technological leadership influences the integration of technology use by university lecturers, and H2. Technological leadership impacts the attitudes of university lecturers towards using technology.

RESEARCH METHODOLOGY

This research conducted using a quantitative research methods, as follows: Quantitative: Survey: Use a structured questionnaire to quantitatively measure the level of technology leadership among university administrators and the level of technology integration by university professors. The questionnaire was designed to capture various aspects of technology leadership and integration. Sampling: The sample for this study would include 317 university administrators and lecturers under the Ministry of Higher Education, Science, Research and Innovation in Thailand. The sample was stratified based on the size of their institutions to ensure representation across different types of universities. Data Analysis: Analyze the collected data using descriptive statistics (Mean, Standard Deviation) to understand the overall trends and patterns in technology leadership and integration. Use Simple Regression Analysis to explore the influence of technology leadership on the integration of technology by university

professors. This can help quantify the relationship and determine the extent to which technology leadership impacts technology integration.

Conceptual framework



Population and samples

1. The population used in this research was 1,718 lecturers from 135 universities under the Ministry of Higher Education, Science, Research, and Innovation,
2. The samples included were 317 university lecturers under the Ministry of Higher Education, Science, Research, and Innovation. The sample size was determined using the sample comparison table of Krejcie and Morgan (1970, p. 608). The samples were chosen with the Stratified Random Sampling method according to the university's size. The Simple Random Sampling method was then used by drawing lots to acquire a designated number of samples in each sample group, as shown in Table 1.

Table 1. Population and sample used in research [Source: own compilation]

University size	Number of universities	Total population (person)	Sample (person)
Small (1-120 people)	79	724	120
Medium (121-600 people)	52	706	163
Large (601-1500 people)	2	61	24
Extra large (1501 people or more)	2	227	10
Total	135	1,718	317

The sample for this study included 317 university administrators and teachers under the Ministry of Higher Education, Science, Research and Innovation, stratified based on the size of their respective educational institutions. This approach renders the sample a robust representation of the broader population for several reasons:

1. Stratification by institution size ensures a variety of viewpoints from both large and small universities, accurately reflecting the diverse environments in which technology is implemented.
2. The substantial number of participants, totaling 317, allows for the collection of comprehensive data, thereby minimizing the potential for bias that might arise from a smaller, less varied sample.
3. Given that the sample encompasses individuals from a wide range of institutions, categorized by their size, the findings are more likely to be generalizable and applicable to a broader population.

Research instrument

Relevant documents, concepts, theories, and research on technology leadership and its impact on technology integration by university lecturers were investigated. They were synthesized to determine terminologies and create a Rating Scale questionnaire using concepts, theories, and other data. The questionnaire was developed to cover all aspects of the research framework (Huang et al., 2022). before being given to five experts to assess its Content Validity, Index of Item Objective Congruence (IOC), content coverage, and linguistic clarity. The IOC index results were between 0.80 - 1.00 from expert opinions. The questionnaire was then adjusted until it was complete and appropriate before being used in a tryout survey with 30 non-sample respondents who shared similar characteristics as

the sample group. The results of this tryout were used to calculate the reliability of the questionnaire using Cronbach's alpha coefficient formula yielding an overall reliability of .99.

Constructs the Indicators

The indicators and scales chosen for the study are based on various aspects of technology leadership and integration. These include factors like leadership and vision, teaching and learning, productivity and professional skills, and others. Each aspect is measured using an interval scale with responses ranging from 'Strongly Agree' to 'Strongly Disagree'. The justification for choosing these indicators and scales lies in their ability to comprehensively assess the complex dynamics of technology leadership and its influence on educational practices in the context of Thai universities. The study employs a structured approach to quantify and understand the relationship between technology leadership and technology integration, providing valuable insights for educational administrators and policy-makers. The indicators for this research constructed as follows:

Table 2. The indicators and scales chosen for the study are based on various aspects of technology leadership and integration. [Source: own compilation]

Construct the indicators	Methods of Measuring Variables	Level of Measurement	Sources of Information for the Researcher's Question Development
Technology leadership (X) - Leadership and vision - Teaching and learning - Productivity and professional skills - Support, administration, and operations - Measurement and evaluation - Social, legal, and ethical Issues	5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree	Interval Scale	(Huang et al., 2022) (Alshareef and Tunio, 2022); (Bunjak and Černe, 2022); (Nguyen et al., 2023); (Mihardjo et al., 2019);
Integration of technology by university lecturers (Y1) - With content knowledge - With pedagogical knowledge - With technological knowledge - With technological pedagogical content knowledge	5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree	Interval Scale	(Duncan et al., 2022); (Lok et al., 2022); (Tlemsani, 2022); (Rybnikova et al., 2022); (Chwen-Li, 2022)
Attitude towards using technology (Y2) - Help students learn faster and more efficiently. - Technology is essential for managing teaching and learning in the present day. - The use of technology in teaching and learning can stimulate students to think, analyze, critique, and research.	5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree	Interval Scale	(Ibrahim et al., 2022); (Mittal et al., 2022); (Amoako et al., 2022);

Data collection

Researcher has designated the period of data collection for this research as 1 January 2022 to 30 June 2022. This deliberate choice in timing is designed not to clash with any important university events-we aim for maximum participation and minimum distraction. To achieve this, the date has been chosen at a time when universities are not again gathered for end of semester exams or major meetings involving university administrators. Before the data collection process, systems and channels used for access to the online questionnaire were prepared to ensure ease of use for the respondents, who were university lecturers under the Ministry of Higher Education, Science, Research, and Innovation. This preparation process included setting the result display to automatically show the statistics of the answered questionnaire. The online questionnaire dashboard was regularly monitored to follow up on responses to obtain complete information from the designated number of respondents. The data collected from the completed questionnaires were processed and analyzed. All 317 sets of the questionnaire were answered, representing 100% response from the sample population.

Data analysis

The collected data were analyzed according to the research objectives. The technology leadership and technology integration parts of the questionnaire were analyzed using descriptive statistics such as Mean and Standard Deviation. Simple Regression Coefficient Analysis was used to examine whether technology leadership influenced the integration of technology by university lecturers in Thailand. The analysis was used to check if there would be correlations per the primary condition of Multiple Linear Regression.

RESULTS

The results on the level of technology leadership were analyzed overall and by aspect using Mean and Standard Deviation.

Table 4. Means and Standard Deviations of the level of technology leadership of university administrators under the Ministry of Higher Education, Science, Research, and Innovation, Thailand. [Source: own compilation]

Aspect	Technology Leadership of Administrators	$\bar{x}$	SD	level
1	Leadership and vision	4.22	.60	High
2	Teaching and learning	4.27	.58	High
3	Productivity and professional skills	4.23	.64	High
4	Support, administration, and operations	4.23	.59	High
5	Measurement and evaluation	4.22	.60	High
6	Social, legal, and ethical Issues	4.27	.59	High
Overall		4.24	.55	High

From Table 4 Thailand's university administrators were found to have an overall high level of technology leadership with a Mean score of 4.24 and a Standard Deviation of .55. When considered by aspects, the administrators were found with a high level of leadership in all aspects, with leadership in "Teaching and Learning" and "Social, Legal, and Ethical Issues" being the highest rated aspects at the highest Mean score of 4.27, and Standard Deviations of .58 and .59 respectively. These were followed by leadership in "Productivity and Professional Skills" and "Support, Administrations, and Operations," which share a Mean score of 4.23, with Standard Deviations of .64 and .59, respectively. The leadership aspects found with the lowest Mean score were "Leadership and Vision" and "Measurement and Evaluation," with a shared Mean score of 4.22 and a shared Standard Deviation of .60.

Table 5. Means and Standard Deviations of the level of technology integration of university administrators under the Ministry of Higher Education, Science, Research, and Innovation, Thailand. [Source: own compilation]

Aspects	Technology Integration	$\bar{x}$	SD	level
1	Content knowledge	4.18	.60	High
2	Pedagogical knowledge	4.25	.57	High
3	Technological knowledge	4.21	.60	High
4	Technological pedagogical content knowledge	4.19	.62	High
Overall		4.20	.54	High

From Table 5 Thailand's university lecturers were found to have an overall high level of technology integration with a Mean score of 4.20 and a Standard Deviation of .54. When considered by aspects, the lecturers were found with a high level of technology integration in all aspects, with the integration of technology with "pedagogical knowledge" being the highest rated aspect at the highest Mean score of 4.25, and a Standard Deviation of .57. This was followed by integration with "content knowledge" (Mean=4.22 and S.D.=60), "technological knowledge" (Mean=4.21 and S.D.=60), and "technological pedagogical content knowledge" (Mean=4.19 and S.D.=62), respectively.

Table 6. Mean and standard deviation of the attitude level towards technology usage among university professors. [Source: own compilation]

Aspects	Technology Integration	$\bar{x}$	SD	level
1	Help students learn faster and more efficiently.	4.24	.67	High
2	Technology is essential for managing teaching and learning in the present day.	4.37	.57	High
3	The use of technology in teaching and learning can stimulate students to think, analyze, critique, and research.	4.18	.73	High
Overall		4.27	.54	High

From Table 6 Mean and standard deviation of the attitude level towards technology usage among university professors. Thailand's university lecturers were found to have an overall high level of attitude towards using technology with a Mean score of 4.27 and a Standard Deviation of .54. When considered by aspects, the lecturers were found with a high level of attitude level towards technology in all aspects, with " help students learn faster and more efficiently." being the highest rated aspect at the highest Mean score of 4.24, and a Standard Deviation of .67. This was followed by attitude towards using technology with " technology is essential for managing teaching and learning in the present day." (Mean=4.37 and S.D.=.57), " The use of technology in teaching and learning can stimulate students to think, analyze, critique, and research." (Mean=4.18 and S.D.=.73), respectively.

Table 7. The simple correlation coefficient between the technology leadership of university administrators and the integration of technology and attitudes towards the use of technology by professors in universities in Thailand. [Source: own compilation]

Technology Integration	$\bar{x}$	SD	level
Technology leadership of University Administrators (X)	1	.66*	.62*
Technology integration by university lecturers (Y ₁)		1	.75*
Attitude towards using technology (Y ₂)			1

Remark * With statistical significance at the 0.05 level.

From Table 7, it is found that the correlation coefficient between the technology leadership of university administrators (X) and the integration of technology (Y₁) and attitudes towards the use of technology (Y₂) by university professors is between .62 and .75. When considering the technology leadership of university administrators with the integration of technology and attitudes towards the use of technology by university professors in each aspect, the results are as follows:

The technology leadership of university administrators (X) has a statistically significant relationship with the integration of technology (Y₁) at the .05 level, with a correlation coefficient (r) of .66.

The technology leadership of university administrators (X) has a statistically significant relationship with attitudes towards the use of technology (Y₂) at the .05 level, with a correlation coefficient (r) of .62."

The integration of technology (Y₁) has a statistically significant relationship with attitudes towards the use of technology (Y₂) among university professors at the .05 level, with a correlation coefficient (r) of .75. This is in line with the initial agreement of data analysis by Multivariate Multiple Regression Analysis (MMR).

The results of the analysis of the technology leadership of university administrators that predicts the integration of technology and attitudes towards the use of technology by university professors, using the Multiple Regression Analysis - Enter Method, are as follows.

Table 8. Results of Standardized Regression Coefficient Analysis of technology leadership influencing technology integration by university lecturers in Thailand. [Source: own compilation]

Technology Integration	a	b	β	SE _b	t	p
Technology leadership (X)	1.45	.65	.66	.04	15.70*	.00

Remark * With statistical significance at the 0.05 level.

Technology leadership of university administrators was found to affect the integration of technology by university professors with statistical significance at the .05 level. The results were used to create a prediction equation as follows:

$$\text{Prediction equation (standardized score) } Y1 = .66(ZX)$$

$$\text{Prediction equation (raw score) } Y1 = 1.45 + .65(X)$$

Table 9. Results of Standardized Regression Coefficient Analysis of technology leadership influencing technology integration by university lecturers in Thailand. [Source: own compilation]

Technology Integration	a	b	β	SE _b	t	p
Technology leadership (X)	1.82	.58	.62	.04	13.84*	.00

Remark * With statistical significance at the 0.05 level.

From Table 9, it is found that the technology leadership of university administrators significantly affects the attitudes towards the use of technology by university professors at the .05 level. The researcher has constructed the following predictive equations:

Prediction equation (standardized score):

$$Y2 = .62 (ZX)$$

Prediction equation (raw score):

$$Y2 = 1.82 + .58(X)$$

CONCLUSION

The results revealed Thailand's university administrators to have an overall high level of technology leadership. When considered by aspects, the administrators were also found with a high level of leadership in all aspects, with leadership in "Teaching and Learning" being the highest-rated aspect. This implies that the administrators supported their lecturers in integrating technology into their teaching, data analysis, and student performance assessment. The university administrators could encourage instructors to use evaluation data to improve teaching plans and learning management, as well as support the application of appropriate technology and innovation in teaching and learning management. This includes the administrators being able to promote professional development in terms of technology usage for lecturers and university personnel. The second highest-rated aspect was technology

leadership in "Social, Legal, and Ethical Issues," which could imply that university administrators encouraged lecturers to have equal access to technology in universities. They could be a good example of using technology with caution and social responsibility under Thailand's Information Act. This includes the university administrators supporting and promoting mandatory safety, health, and environmental measures for technology usage in educational institutions. The administrators also formulated policies to raise awareness of the relationship between technology and social, legal, and ethical issues among lecturers and other academic personnel. This is consistent with an explanation of "technology leadership" (Alshareef & Tunio, 2022). as the ability of educational administrators to use technology for effective management and vision creation, as well as to promote and support the use of technology in the integration of student-centered education. Technology leaders must be able to manage with a focus on universality and learn technology continuously to improve themselves and others, effectively achieve their goals, and keep up with changes in the Digital world. The qualities of technology leadership lie in (1) leadership and vision, (2) teaching and learning, (3) productivity and professional skills, (4) support, administration, and operations, (5) measurement and evaluation, and (6) social, legal, and ethical issues.

Technology leadership was found to influence the integration of technology by university lecturers in Thailand at a statistical significance level of .05 and a standardized regression coefficient of 0.66. This is consistent with Duncan et al. (2022). who explored the effects of school administrators' technology leadership on the school environment and the use of teachers' technology integration in indicating the effectiveness of teachers in top secondary schools under the Office of the Basic Education Commission at the sub-district level. It found that the technology leadership of administrators in top secondary schools at the sub-district level had a direct influence on teacher effectiveness, while the school environment had an indirect effect on teacher effectiveness through technology knowledge and integration. This study's model corresponded to the theoretical framework and could be used to explain 83% of teacher effectiveness. Lok et al., (2022). investigated the relationship between technology leadership and academic administration of school administrators under the Office of Non-formal Education and Informal Education in Saraburi Province, Thailand, in another study. The findings revealed that school administrators' technology leadership was highly correlated with their academic administration, with statistical significance at the .01 level. This corresponds to Tlemsani, (2022). who explained that capable administrators could elevate teaching and learning to meet curriculum standards and facilitate learning using various technologies. This includes the ability to explain the characteristics of teaching and learning and to use technology that meets the needs of learners (Rybnikova et al., 2022).

SUGGESTIONS

Since technology leadership was found with a significant influence on the integration of technology by university lecturers in Thailand, it is critical to support and encourage technology leadership among education administrators. The administrators should also promote and support the use of technology in teaching and learning that improves learner quality. There should be continuous supervision and an environment conducive to teaching and learning management. Furthermore, the administration should prioritize technology

management, particularly in developing teachers' knowledge and skills through training to promote technological operational and problem-solving skills. There should also be clear guidelines for teacher development.

CONTRIBUTION

The contributions of this research can be outlined as follows:

Enhanced Understanding: This research will deepen the understanding of the level of technology leadership among university administrators and its influence on the integration of technology by university professors in Thailand. This is a critical area of study given the increasing importance of technology in higher education. **Empirical Evidence:** The research will provide empirical evidence on the relationship between technology leadership and technology integration in universities. This can inform future research and theory development in this area.

Informing Practice: The findings can inform practice by providing insights that university administrators can use to enhance their technology leadership and promote more effective technology integration. **Policy Recommendations:** The research can also inform policy by providing evidence-based recommendations for the Ministry of Higher Education, Science, Research and Innovation in Thailand on how to support and enhance technology leadership and integration in universities. **Methodological Contribution:** The use of both qualitative and quantitative methods in this research can provide a more comprehensive understanding of the research problem. This mixed-methods approach can serve as a model for future research in this area. **Contribution to Literature:** This research will add to the existing body of literature on technology leadership and technology integration in higher education, particularly in the context of Thailand. This can be a valuable resource for other researchers studying similar issues in other contexts.

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