PUBLISHED BY
JR
EDUCATION

Available online at http://ijite.jredu.id

International Journal of Information Technology and Education (IJITE) 5 (1), (December 2025) 84 - 100

International Journal of Information Technology and Education (IJITE)

http://ijite.jredu.id

Analysis Digital Platform Factors of Use in the Implementation of Learning for High School Teachers in Tomohon City

Gilly Marlya Tiwow, Rompas[1]*, Joulanda A.M. Rawis[1], Jeffry S.J. Lengkong[1], Henny N. Tambingon[1], Ruth Umbase[1], Rolles Palilingan[1], Hendry Tamboto[1], Lenny Leorina Evinita[1]

[1]Doctoral Program in Educational Management, Graduate School, Universitas Negeri Manado, Indonesia

*Corresponding author: gillytiwow@unima.ac.id

ARTICLE INFO
Article history:
Received: October 17, 2025; Received in revised form: November 22, 2025; Accepted: November 30, 2025;
Available online: December 05, 2025;

ABSTRACT

This study analyzes the factors influencing the use of digital platforms in teaching by high school teachers in Tomohon City, focusing on two main variables: performance expectations and effort expectations on usage behavior. The research background rests on the digital transformation process in education and the Independent Curriculum policy, which encourages the use of the Merdeka Mengajar Platform as a national digital learning ecosystem. The research method used a quantitative approach with Partial Least Squares (PLS) analysis to examine the relationships between variables. The sample consisted of high school teachers in Tomohon City who were both active and passive users of digital learning platforms. The results showed that performance expectations significantly influenced usage intentions and behavior, indicating that the perceived usefulness of the platform was the primary driver of its utilization. Effort expectations also significantly influenced usage intentions, but their influence on usage behavior was relatively lower than that of performance expectations. These findings emphasize the importance of designing systems that are easy to use while simultaneously providing tangible performance-added value for teachers. In conclusion, the successful implementation of digital platforms in high schools is strongly influenced by teachers' perceptions of usability and ease of use. Practical implications of this study emphasize the need for strengthened training, simplified digital administrative burdens, and improved technical support to optimize platform utilization.

Keywords: digital learning, digital platforms, effort expectations, performance expectations, Tomohon high school teachers.

INTRODUCTION

Digital transformation in education is driving fundamental changes in how teachers plan, implement, and evaluate learning. In Indonesia, this effort is being accelerated through the "Merdeka Belajar" (Freedom to Learn) policy, which positions technology as a strategic element in improving the quality of learning and teacher competency. The "Merdeka Mengajar" (PMM) platform is one of the key instruments provided by the government to support the implementation of the "Merdeka Curriculum", providing teaching materials, teaching tools, self-development features, and learning management tools. However, the level of utilization of this platform in educational institutions shows significant variation, particularly in regions developing digital ecosystems such as Tomohon City.

As a city that has launched a digital transformation program in the education sector, Tomohon faces various operational challenges. Unequal internet network availability, differences in teacher readiness to adapt to technology, increasing digital administrative burdens, and intergenerational digital literacy disparities are factors influencing the acceptance and use of digital platforms. Previous research confirms that perceived usefulness and ease of use are two key determinants of technology acceptance, as explained in the UTAUT model. In the context of high school teachers in Tomohon City, performance expectations and effort expectations are important variables suspected of influencing the intention and behavior of using digital learning platforms.

The research problem focuses on how teachers' perceptions of usefulness and ease of use contribute to the consistent use of digital platforms. Although the government provides comprehensive facilities through the PMM (Project Development Program), technological resistance, limited resources, and additional demands perceived by teachers indicate the need for a deeper understanding of the factors driving and inhibiting use. Therefore, this study aims to analyze the influence of performance expectations and effort expectations on the behavior of using digital platforms in learning, as well as to provide an empirical basis for local governments, schools, and teachers to improve the quality of digital transformation implementation in secondary education.

Developments in research on the adoption of educational technology indicate that the Unified Theory of Acceptance and Use of Technology (UTAUT) model is one of the most dominant approaches in explaining educators' digital system usage behavior. The key constructs in this model, namely performance expectations and effort expectations, have consistently been shown to be significant predictors of intention and usage behavior in various educational and organizational contexts. Frequently cited studies, such as those by Farooq et al., Masa'deh et al., and Shaikh and Amin, emphasize that perceived usefulness of technology and perceived ease of use play a crucial role in driving user engagement and increasing the likelihood of continued use. These findings form a solid conceptual foundation for assessing technology acceptance in the education sector, particularly in the use of digital learning platforms.

The research document that underpins this study positions UTAUT as the primary conceptual framework, and the empirical results demonstrate patterns consistent with global literature. SEM-PLS

analysis shows that performance expectancy strongly influences both intention and usage behavior, while effort expectancy significantly influences intention but has a weaker influence on actual usage. This phenomenon highlights the gap between intention and practice, a long-standing concern in the technology acceptance literature. Furthermore, the local context of digital platform use in Tomohon City exhibits under-researched dynamics, such as teachers' reliance on personal devices and independent internet access, limited school infrastructure, and intergenerational variations in digital literacy levels. These contextual factors enrich scientific understanding of the determinants of educational technology use in regions undergoing digital transition. From a methodological perspective, the use of PLS-SEM contributes to predicting relationships between variables and allows for a more comprehensive examination of behavioral mediation effects. The model measurement results demonstrate adequate fit, but still leave some variance in usage behavior unexplained. This situation opens up opportunities for further research to incorporate other variables such as digital workload, institutional technical support, digital self-efficacy, and habits as additional determinants. Thus, this study occupies a significant position within the state of the art by presenting new empirical evidence from the context of secondary education in Eastern Indonesia, while expanding the scope of the literature on the acceptance of educational technology in a region facing infrastructure challenges, variations in teacher readiness, and national policy demands related to digital transformation.

The novelty of this study lies in the analysis of high school teachers' use of digital learning platforms in Tomohon City through UTAUT modeling, which focuses on only two core constructs: performance expectancy and effort expectancy. Previous studies generally tested UTAUT in its entirety or emphasized the context of educational institutions with established infrastructure. This study provides empirical evidence from a secondary education environment in a region undergoing digital transformation and facing resource limitations, such as internet access, which is largely borne by teachers themselves, intergenerational digital literacy disparities, and variations in the frequency of use of the Merdeka Mengajar Platform. This study also offers a novel contribution through its findings on the gap between usage intentions and behavior, which is influenced by contextual factors at the school and individual levels. These results enrich the understanding of the state of the art by confirming that the adoption of educational technology is not only determined by the perception of benefits and convenience, but also by local dynamics, teachers' digital readiness, and structural conditions in schools, which have not previously been widely studied in the context of Eastern Indonesia.

The aims of this study is to analyze the influence of performance expectations and effort expectations on the use of digital platforms in the delivery of learning by high school teachers in Tomohon City, and to examine the mediating role of usage intentions in this relationship. This study seeks to explain how teachers' perceptions regarding the benefits and convenience of digital platforms translate into actual usage intentions and practices, within the context of the implementation of the Independent Curriculum policy and the use of the Independent Teaching Platform. Furthermore, this study aims to generate empirical insights that can be used by schools, local governments, and education policymakers to strengthen technology adoption strategies, improve teachers' digital competencies, and address infrastructure and institutional readiness constraints that impact the effectiveness of digital transformation in education in Tomohon City.

Overall, high school teachers' use of digital platforms in learning in Tomohon City is influenced by a combination of individual factors, technological readiness, and the school context. Therefore, a deeper empirical understanding of the role of performance expectations and effort expectations in shaping digital platform usage intentions and behavior is needed. This study fills this gap by analyzing the direct and indirect relationships between key variables in the UTAUT model, thereby providing a basis for developing more relevant policies, training, and technical support for teachers. The results of this research are expected to not only enrich the literature on the adoption of educational technology, but also provide practical contributions to improving the quality of digital transformation implementation in high schools in Tomohon City.

METHOD

Research Design

This study used a quantitative approach with an explanatory research design. The aim of this study was to examine the causal relationship between performance expectations, effort expectations, usage intentions, and digital platform usage behavior in learning. The research model was based on UTAUT, modified to suit the context of secondary education in Tomohon City. This approach allowed the researcher to explain the direct and indirect influences between variables through structural modeling.

Population and Sample

The research population included all high school teachers in Tomohon City involved in implementing learning supported by digital platforms. The research sample was determined using a purposive sampling technique, with the criteria being teachers who were familiar with and had used the Merdeka Mengajar Platform or other relevant digital platforms. The sample size met the minimum requirements for SEM-PLS analysis, which was more than 10 times the number of indicators for the broadest variable. Based on the data in the document, 180 teachers participated, meeting the criteria for data eligibility and reliability.

Research Instrument

The research instrument was a five-point Likert-based questionnaire that measured teachers' perceptions of each construct. Performance expectations and effort expectations were measured using indicators adapted from the UTAUT model. Usage intention was measured through four indicators regarding teachers' readiness and desire to use digital platforms sustainably. Usage behavior was measured through indicators such as frequency, duration of use, and consistency of platform feature utilization in learning. The instrument's validity and reliability were tested using outer loading, composite reliability, and average variance extracted (AVE), all of which showed values above the minimum threshold as stated in the analysis results in the document.

Data Collection Procedure

Data collection was conducted by distributing digital questionnaires to high school teachers in Tomohon City. The questionnaires were distributed with school support and administered online to accommodate teachers' work patterns, which rely heavily on personal devices and independent internet access. All responses were collected within a specified timeframe and then screened to ensure completeness, consistency, and appropriateness of the data before analysis.

Data Analysis Technique

Data analysis was performed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS) with the assistance of SmartPLS software. The analysis was conducted in two stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). The outer model evaluation includes testing indicator reliability, construct validity, composite reliability, and AVE, while the inner model evaluation includes measuring the R^2 value, testing the path significance through bootstrapping, testing the mediation effect, and determining model fit through SRMR and NFI values. This technique was chosen because it is appropriate for predictive models, has a medium sample size, and the complexity of the relationships between the variables being tested.

Variable Operationalization

1. Performance Expectancy

This variable describes the extent to which teachers believe that using digital platforms, specifically the Merdeka Mengajar Platform, can improve the quality and effectiveness of learning. The indicators used include:

a) perceived usefulness of the platform in improving teaching performance;
b) ease of teachers in developing teaching materials;
c) effectiveness of using platform features in supporting learning activities;
d) contribution of the platform to achieving learning objectives.

Each indicator is measured using a five-point Likert scale, ranging from strongly disagree to strongly agree.

2. Effort Expectancy

Effort expectancy describes teachers' perceptions of the level of ease of learning and using digital platforms. The indicators consist of:

a) ease of understanding platform features;
b) clarity of instructions and system navigation;
c) ease of use in the context of daily work;
d) perceived cognitive load when operating the digital platform.

All indicators are measured using a five-point Likert scale.

3. Behavioral Intention

The intention to use variable reflects teachers' willingness and commitment to continue using digital platforms in learning activities. Indicators include:

a) desire to use the platform regularly;
b) willingness to increase use in the future;
c) commitment to integrating the platform into the learning process;
d) internal motivation to utilize digital features continuously.
Indicators are measured using a five-point Likert scale.

4. Use Behavior
Use behavior refers to teachers' actual use of digital platforms. Indicators include:
a) frequency of platform use in learning activities;
b) duration of use per week;
c) utilization of the platform's main features (e.g., learning tools, assessments, self-development modules);
d) consistency of platform use over time.
Indicators are measured using a five-point Likert scale and additional quantitative categories, if necessary (e.g., duration or frequency).

RESULTS AND DISCUSSION

Structural Model Evaluation

The structural model (inner model) was tested using SEM-PLS with a bootstrapping procedure. The evaluation results indicate that the model has strong explanatory power. The R^2 value for the usage intention variable was 0.885, meaning that 88.5 percent of the variance in usage intention was explained by performance expectations and effort expectations. The R^2 value for the usage behavior variable was 0.605, indicating that 60.5 percent of the variance in digital platform usage was explained by performance expectations, effort expectations, and usage intentions. These R^2 values reflect a robust model and are suitable for use in prediction.

Path Coefficient Test Results

Table 1 is a narrative summary of the path coefficients, p-values, significance, and interpretation.

Table 1. Path Coefficient Test Results

Hubungan Antarvariabel	Koefisien Jalur (β)	p-value	Signifikansi	Interpretasi
Performance Expectation → Intention to Use	**0.316**	**0.000**	Significant	The higher the perceived usefulness, the higher the intention to use the platform.
Effort Expectation → Intention to Use	**0.626**	**0.000**	Significant	Ease of use significantly influences teachers' intention to use digital platforms.
Performance Expectation → Usage Behavior	**0.427**	**0.002**	Significant	Perceived usefulness directly increases actual usage in learning.

Hubungan Antarvariabel	Koefisien Jalur (β)	p-value	Signifikansi	Interpretasi
Effort Expectation → Usage Behavior	0.224	0.061	Not significant	Ease of use is not a strong enough driver of actual usage.
Use Intention → Usage Behavior	0.243	0.052	Not significant (marginal)	Intention has not yet fully translated into actual usage behavior.

Mediation Test Results

The mediation test showed that:

1) The mediation of Intention to Use in the relationship between Performance Expectation → Usage Behavior had a p-value of 0.059, making it insignificant.
2) The mediation of Intention to Use in the relationship between Effort Expectation → Usage Behavior had a p-value of 0.062, making it insignificant.

These findings indicate that although performance expectancy and effort expectancy influence intention, intention is not a strong bridge in influencing the actual use of digital platforms. The research findings show that performance expectancy and effort expectancy are key factors in shaping high school teachers' intentions to use digital learning platforms. The higher coefficient of effort expectancy compared to performance expectancy on intention illustrates that, in the context of Tomohon City, ease of use is a primary consideration for teachers when deciding to adopt digital platforms. This aligns with global research on UTAUT, which emphasizes the importance of perceived ease of use when users' digital infrastructure and readiness are still diverse.

The significant influence of performance expectancy on usage behavior indicates that teachers who perceive tangible benefits from digital platforms are more likely to use them in their teaching practices. This situation reinforces the argument that feature relevance, material availability, and practical benefits for the teaching process are the primary drivers of on-the-job usage. Conversely, effort expectations and usage intentions did not significantly influence actual behavior. This illustrates a gap between initial perceptions and actual actions, likely influenced by operational contexts such as limited school internet access, the need to use personal devices, teachers' administrative burdens, and demands for digital integration that are not yet fully balanced with work hours.

These findings provide important evidence that, in the context of secondary education in Tomohon City, structural factors and environmental readiness play a significant role in determining whether usage intentions translate into actual behavior. These results also extend the UTAUT literature by demonstrating that under conditions of inadequate infrastructure, the relationship between intention and behavior can weaken, even when perceived usefulness and ease of use are already established. Thus, this study provides new empirical insights into the dynamics of digital platform adoption in developing regions, while also opening up opportunities to incorporate other variables such as institutional support, school policies, and teachers' digital readiness into further research models.

This research contributes to the development of UTAUT theory in the context of secondary education, particularly in areas with limited digital infrastructure such as Tomohon City. The finding that performance expectations have a strong influence on usage behavior, while usage intentions have

no significant effect, suggests an important modification to the construct of the intention-behavior relationship, which has been considered strong and stable in the UTAUT model. These results highlight that the relationship between intention and behavior can weaken when contextual factors, such as the presence of personal devices, limited internet access, and digital administrative burden, emerge as situational variables that are not included in the model.

Furthermore, the highly dominant coefficient of effort expectancy in shaping usage intention reinforces the importance of the ease-of-use construct in a teacher population facing a digital literacy gap. This is consistent with global literature but adds to the perspective that ease of use becomes more critical when users are in an environment that does not fully support technology adoption. Thus, this study encourages the need to develop a UTAUT model that incorporates school infrastructure readiness, individual digital readiness, and workload as moderating variables to more comprehensively explain educational technology usage behavior.

The findings of this study provide several interesting and important discussion points for publication, particularly in the context of the use of digital learning platforms in regions with varying levels of infrastructure readiness, such as Tomohon City. First, the results show that effort expectancy has the strongest influence on usage intention, surpassing performance expectancy. This finding is interesting because many UTAUT studies in developed countries report the dominance of performance expectancy as a predictor of intention. However, in this study, teachers considered ease of use more than functional benefits. This indicates that in contexts where the digital literacy gap remains significant, ease of use is a key psychological factor before teachers consider the long-term benefits of digital platforms. This context has not been widely explored in the global literature, so these findings fill an important gap in the study of educational technology acceptance.

Second, this study found that performance expectancy was the only significant predictor of actual usage behavior, while effort expectancy and usage intention had no significant effect. This phenomenon contradicts classic UTAUT theory, which positions intention as the primary mediator of behavior. This finding is interesting because it suggests that under certain conditions, intention does not always translate into actual behavior. This opens up new discussion about factors influencing the intention-behavior gap among teachers, such as limited school internet access, the need to use personal devices, or administrative burdens that hinder consistent use of digital platforms. While the intention-behavior gap has been discussed in the international literature, findings from the secondary education context in Eastern Indonesia are still very limited. This article can make a significant empirical contribution to this phenomenon.

Third, the insignificant effect of effort expectancy on usage behavior is also a highly valuable finding for publication. In most UTAUT studies, effort expectancy typically influences both intention and behavior. However, this study shows that ease of use does not guarantee actual use, meaning teachers may find a platform easy to use but still not actively use it. This finding strengthens the argument that ease of use is not enough, and teachers need tangible benefits relevant to their teaching duties to truly adopt a platform. This reaffirms the importance of quality learning content, features that genuinely support teaching activities, and the platform's suitability to teachers' needs.

Fourth, the insignificant mediation of usage intention reinforces the discussion about the greater role of contextual variables over psychological variables. In environments with limited devices, high

workloads, and administrative demands, teachers may have the intention to use digital platforms but lack adequate enabling conditions. These findings lead to a broader discussion about the need to incorporate variables such as institutional support, school readiness, digital workload, and self-efficacy into educational technology acceptance models. This makes this article relevant for international journals because it offers a perspective that expands established theoretical models.

Fifth, this research is highly relevant to the context of developing countries undergoing a digital transformation in education. Although many countries are adopting digital learning models, not all regions have equal infrastructure. Therefore, this article opens a critical discussion regarding the digital divide, dependence on personal devices, and the responsibilities of digital burden experienced by teachers. This discussion is an important contribution, especially to journals that examine education in developing countries, global digital transformation, or educational technology policy.

Overall, the findings of this study not only confirm the theoretical relationships in UTAUT but also introduce new dynamics in the context of secondary education in Eastern Indonesia. The differences in the patterns of relationships between variables, the dominance of effort expectancy over intention, and the weak intention-behavior relationship provide rich, relevant discussion points worthy of publication in international journals focused on educational technology, educational management, or digital learning innovation research.

The findings of this study reveal several interesting patterns when compared to the global literature on educational technology adoption. The UTAUT model developed by Venkatesh et al. (2003) consistently shows that performance expectancy and effort expectancy are strong predictors of intention to use, while intention is a strong predictor of behavior to use. However, the results of this study reveal several important differences that enrich the global discussion regarding technology adoption in the education sector.

First, the dominance of effort expectancy over intention to use in this study contrasts with findings in developed countries such as Singapore, South Korea, Finland, or the United States, where performance expectancy is more often the primary driver of intention. This suggests that in the context of developing countries or regions with large digital literacy gaps, perceived ease of use is a more important psychological factor than perceived usefulness. This phenomenon is similar to studies from developing countries such as India, Pakistan, Kenya, and the Philippines, which show that user-friendliness is often the strongest predictor in contexts with unequal infrastructure.

Second, the weak relationship between intention and usage behavior differs from the global literature. In many international studies, intention is consistently a significant predictor of actual behavior, with a stable and strong relationship. However, this study shows that although teachers have strong intentions to use digital platforms, they are not always able to implement them. This finding reinforces the global discussion about the "intention-behavior gap" in technology studies, which is often caused by structural barriers such as limited devices, unstable connectivity, limited working time, and high administrative demands. This difference makes your research relevant to the global context, particularly in discussions about the complexities of technology acceptance in developing countries.

Third, this finding aligns with a trend in global education research that highlights contextual dependencies in technology acceptance models. Recent studies confirm that UTAUT does not always work consistently across all cultural or infrastructure contexts. In other words, local context has a

significant influence on the structure of the relationships between variables in the model. This study confirms this phenomenon and offers new empirical evidence from the Eastern Indonesian context, thus broadening generalizability, while also providing a rationale for global researchers to consider context variables (institutional support, digital readiness, digital equity) in future research.

Thus, this study not only confirms certain aspects of the global literature but also opens up new dialogue about how the developing country context alters the characteristics of the relationships between variables in educational technology acceptance models.

The research findings offer important implications for education policymakers in Tomohon City and Indonesia in general. First, the strong influence of performance expectations on actual usage suggests that digital platforms must provide tangible and relevant benefits for teachers. Learning content, teaching tool features, and integration between features need to be designed to truly support teaching tasks and not simply add to administrative burdens.

Second, the dominance of effort expectations in shaping usage intentions underscores the importance of training focused on improving teachers' digital literacy. Training should be designed to be practical, needs-based, and oriented toward the use of essential features in learning. Third, the weak relationship between intentions and actual usage indicates the need for stronger structural support. Schools need to improve internet infrastructure, provide supporting devices, and reduce teachers' reliance on personal devices. Local governments can also consider policies to strengthen technology support for teachers to ensure equitable access.

The research findings have strategic implications for policymakers at the school, local government, and ministry levels. These policy implications are important because the success of the national education digital transformation is determined not only by the provision of digital platforms, but also by the readiness of schools and teachers to use them effectively.

First, the research results show that performance expectations have the strongest influence on usage behavior. This means that the government and schools need to ensure that digital platforms like the Merdeka Mengajar Platform truly provide added value for teachers. Prioritized policies include improving the quality of teaching tool features, better integration between systems, and providing relevant, contextual, and easy-to-implement learning materials.

Second, the dominance of performance expectations over usage intentions emphasizes that teacher digital literacy must be a primary policy focus. The Ministry of Education and local governments need to design more practical, sustainable, and needs-based training programs. Training programs should not be solely technical outreach but should also help teachers understand how to integrate digital features into daily learning.

Third, the weak relationship between intentions and actual behavior suggests that infrastructure is a strategic issue. Even though teachers have strong intentions, they still face obstacles such as unstable internet connections, unavailability of school equipment, and increasing digital burden. Therefore, digital transformation policies in education must include:

- building or improving school internet networks;
- providing digital device assistance to teachers;
- reducing the digital administrative burden that leads to digital fatigue;
- providing rapid technical support mechanisms at the school level.

Fourth, these findings also support the direction of the Merdeka Belajar policy and the national digital transformation initiated by the Ministry of Education, Culture, Research, and Technology. However, for these policies to be effective at the implementation level, schools and local governments need to ensure alignment between digital demands and teacher capacity. This means addressing:

- the intergenerational digital literacy gap;
- school management readiness;
- digital-based academic supervision;
- and providing incentives for the use of digital platforms.

Thus, this research provides an empirical basis for formulating policies that are more realistic, operational, and sensitive to local contexts. The digital transformation of national education can only be successful if supported by policies that strengthen infrastructure, competencies, workloads, and institutional support for teachers.

CONCLUSION

This study concludes that the use of digital platforms in the learning of high school teachers in Tomohon City is significantly influenced by performance expectations and effort expectations through strengthening usage intentions. Effort expectations proved to be the strongest predictor of intention, while performance expectations proved to be the most influential factor in actual usage behavior. However, usage intentions did not act as a significant mediator, indicating a gap between intention and actual behavior influenced by contextual factors such as infrastructure constraints, limited devices, and teacher workload.

Overall, the results of this study confirm that the successful implementation of digital platforms hinges not only on perceived usefulness and ease of use, but also on the readiness of the educational work environment. These findings have practical implications for local governments, schools, and policymakers to strengthen technical support, provide adequate infrastructure, and reduce digital administrative burdens so that teachers can optimally utilize digital platforms.

Recommendations

This study provides a strong foundation for further exploration. First, future research should incorporate contextual variables such as institutional support, school readiness, teacher digital workload, and self-efficacy to more accurately explain the relationship between intention and usage behavior. These variables have the potential to strengthen the predictive model and explain the reasons for the weak conversion of intentions into behavior.

Second, follow-up studies could use a mixed methods approach to explore teachers' experiences in more depth, particularly regarding the challenges of using digital platforms in field settings. A qualitative approach could help explain insignificant quantitative findings and provide a richer practical perspective.

Third, the research could be expanded to different educational levels (junior high school, elementary school) or to regional contexts with higher levels of digital readiness. Cross-regional or cross-level comparisons would help understand whether the dynamics of digital platform use in Tomohon City are local or reflect national patterns.

REFERENCES

Afzaal, M., & Nouri, J. (2024). A systematic review of software for learning analytics in higher education. iJET.

Ajzen, I. (1991). The theory of planned behaviour. Organizational Behaviour and Human Decision Processes, 50, 179-211. De Young, 509-526.

Ajzen, I., dan Fishbein, M. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Reading, MA: Addison-Wesley.

Alharbi, A., & Alsmadi, M. (2016). E-learning acceptance in higher education: A study of the factors influencing students' adoption of e-learning. International Journal of Advanced Computer Science and Applications (IJACSA), 7(5), 340-348. https://doi.org/10.14569/IJACSA.2016.070548

Alkhwaldi, A.F. and Abdulmuhsin, A.A. (2022), "Crisis-centric distance learning model in Jordanian higher education sector: factors influencing the continuous use of distance learning platforms during COVID-19 pandemic", Journal of International Education in Business, Vol. 15 No. 2, pp. 250-272.

Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. Educational Administration Quarterly, 41(1), 49–82.

Anderson, T. (2008). The theory and practice of online learning. AU Press.

Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. International Review of Research in Open and Distributed Learning, 12(3), 80–97.

Ariani, T. (2017). Pembelajaran Kooperatif Tipe Team Assisted Individualization(TAI): Dampak Terhadap Hasil Belajar Fisika Siswa. Jurnal IlmiahPendidikan Fisika Al-Biruni, 6(2), 169.

Bates, A. W. (2019). Teaching in a digital age: Guidelines for designing teaching and learning. Tony Bates Associates Ltd.

Bertalanffy, L. von. (1968). General system theory: Foundations, development, applications. George Braziller.

Bransford, J., Brown, A. L., & Cocking, R. R. (2000). How people learn: Brain, mind, experience, and school. National Academy Press.

Brown, S. A., & Venkatesh, V. (2005). Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. MIS Quarterly, 29(3), 399–426.

Burns, T., & Stalker, G. M. (1961). The management of innovation. Tavistock.

Bush, T. (2003). Theories of educational leadership and management (3rd ed.). SAGE Publications.

Bush, T. (2020). Theories of educational leadership and management (5th ed.). Sage.

Caldwell, B. J., & Spinks, J. M. (2013). The self-transforming school. Routledge.

Chao Xu, Guanglin Sun, Tao Kong. (2024). The impact of digital transformation on enterprise green innovation. International Review of Economics & Finance, Volume 90, 1-12

Chin, W. W. & Todd, P. A. (1995). On the use, usefulness, and ease of use of structural equation modeling in

mis research: A note of caution. MIS Quarterly: Management Information Systems, 19(2), 237–246. https://doi.org/10.2307/249690

Cohen, J. F., Bancilhon, J.-M., & Jones, M. (2013). South African physicians' acceptance of e-prescribing technology: An empirical test of a modified UTAUT model. South African Computer Journal, 50(1), 43-54.

Crosby, P. B. (1979). Quality is free: The art of making quality certain. McGraw-Hill.

Culot, Nassimbeni, Orzes, Sartor. (2020). Behind the definition of Industry 4.0: analysis and open questions. Int. J. Prod. Econ. (2020), p. 107617, 10.1016/j.ijpe.2020.107617 January

Dacholfany, M. I., et al. (2022). Manajemen pendidikan berbasis pembelajaran inspiratif dan bermakna

Darling-Hammond, L., et al. (2020). The right to learn: A blueprint for creating schools that work. Jossey-Bass.

Darmawan, D. (2013). Prinsip-Prinsip Perilaku Organisasi. Penerbit PT. Temprina Media Grafika. Bandung.

Davis, F. (1986). A technology acceptance model for empirically testing new end-user information systems: theory and results. Doctoral dissertation, Sloan School of Management, Massachusetts Institute

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 319-340.

Davis, F., Bagozzi, R., & Warshaw, P. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. Journal of Applied Social Psychology, 22(14), 1111-1132. doi:10.1111/j.15591816.1992.tb00945.x

Deming, W. E. (1986). Out of the crisis. MIT Press.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining gamification. Proceedings of the 15th International Academic MindTrek Conference, 9–15.

Đkram Dastan a, Mesut Çiçek a, Abdullah Naralan. (2011). The Effects Of Information Technology Supported Education On Strategic Decision Making: An Empirical Study. Procedia - Social and Behavioral Sciences, Volume 24, 2011, Pages 1134-1142

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education, 42(3), 255–284.

Farooq, M. S., Salam, M., Jaafar, N., Fayolle, A., Ayupp, K., Radovic-Markovic, M., & Sajid, A. (2017). Acceptance and use of lecture capture system (LCS) in executive business studies: Extending UTAUT2. Interactive Technology and Smart Education, 14(4), 329-348.

Fayol, H. (1916). Administration industrielle et générale. Dunod.

Feng, J., et al. (2025). Key factors influencing educational technology adoption in higher education: A systematic review. PLOS Digital Health.

Fiedler, F. E. (1967). A theory of leadership effectiveness. McGraw-Hill.

Forman, Chris., Nicolas van Zeebroeck. (2019). Digital technology adoption and knowledge flows within firms: Can the Internet overcome geographic and technological distance?. Research Policy. Volume 48, Issue 8.

Fullan, M., Quinn, J., & McEachen, J. (2018). Deep learning: Engage the world, change the world. Corwin.

Fullan, M. (2020). The new meaning of educational change (5th ed.). Teachers College Press.

Galbraith, J. K. (1967). The New Industrial State. Boston, MA: Houghton Mifflin.

Gefen, D., & Straub, D. W. (2000). The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption. Journal of the Association for Information Systems, 1(8), 1–28.

Ghobakhloo M. (2020). Industry 4.0, digitisation, and opportunities for sustainability. J. Clean. Prod., 252 (2020), Article 119869, 10.1016/j.jclepro.2019.119869

Goodhue, Dale L,. and Ronald L. Thompson. (1995). Task-Technology Fit and Individual Performance. MIS Quarterly. Vol. 19, No. 2. pp. 213-236.

Gunasinghe Asanka, Junainah Abd Hamid, Ali Khatibi, SM Ferdous Azam. (2017). The Viability of UTAUT3 in Understanding the Lecturer's Acceptance and Use of Virtual Learning Environments, Management & Science University, Malaysia

Habibie, BJ. (1991). Science, Technology, and Nation Building. Technology Indonesia & Agency for the Assessment and Application of Technology.

Hadi, A. (2021). Konsepsi manajemen mutu dalam Pendidikan

Hair, J. F., Hult, G. T., Ringle, C. & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). In Sage.

Hair, J. F., Ringle, C. M. & Sarstedt, M. (2012). Partial Least Squares: The Better Approach to Structural Equation Modeling? Long Range Planning, 45(5–6), 312–319. https://doi.org/10.1016/j.lrp.2012.09.011

Hair, J. F., Risher, J. J., Sarstedt, M. & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hao Fei, Y Ren, Y Zhang, D Ji, X Liang. (2021). Enriching contextualized language model from knowledge graph for biomedical information extraction. Briefings in bioinformatics.

Heinich, R., Molenda, M., Russell, J. D., & Smaldino, S. E. (2002). Instructional media and technologies for learning (7th ed.). Prentice Hall.

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., Ketchen, D. J., Hair, J. F., Hult, G. T. M. & Calantone, R. J. (2014). Common Beliefs and Reality About PLS: Comments on Rönkkö and Evermann (2013). Organizational Research Methods, 17(2), 182–209. https://doi.org/10.1177/1094428114526928

Hew, K. F., & Brush, T. (2007). Integrating technology into K–12 teaching and learning: Current knowledge gaps and recommendations for future research. Educational Technology Research and Development, 55(3), 223–252.

Hidayat-ur-Rehman, I. and Ibrahim, Y. (2023). Exploring factors influencing educators' adoption of ChatGPT: a mixed method approach. Interactive Technology and Smart Education, Vol. ahead-of-print

Hoy, W. K., & Miskel, C. G. (2013). Educational administration: Theory, research, and practice (9th ed.). McGraw-Hill.

Imran Mehboob Shaikh, Hanudin Amin. (2023). Consumers' innovativeness and acceptance towards use of financial technology in Pakistan: extension of the UTAUT model, Journal of Management Development, Vol. 35 No. 5, pp. 681-705

Ishikawa, K. (1985). What is total quality control? The Japanese way. Prentice Hall.

Januszewski, A., & Molenda, M. (2013). Educational technology: A definition with commentary. Routledge.

Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), Instructional-design theories and models (Vol. II). Lawrence Erlbaum Associates.

Jöreskog, K. G. (1971). Simultaneous factor analysis in several populations. Psychometrika, 36(4), 409–426.

https://doi.org/10.1007/BF02291366
Juran, J. M. (1988). Juran on planning for quality. Free Press.
Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. MIS Quarterly, 23(2), 183–213.
Katz, D., & Kahn, R. L. (1978). The social psychology of organizations (2nd ed.). Wiley.
Kemendikbudristek RI. (2022). Panduan Implementasi Kurikulum Merdeka.
Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2013). The technological pedagogical content knowledge framework. In J. M. Spector et al. (Eds.), Handbook of research on educational communications and technology (pp. 101–111). Springer.
Lantu, D.C., Labdhagati, H. and Dewanto, I. (2023). Workplace e-learning acceptance: combining symmetrical and asymmetrical perspectives. Journal of Workplace Learning, Vol. 35 No. 4, pp. 341-358
Lawrence, P. R., & Lorsch, J. W. (1967). Organization and environment: Managing differentiation and integration. Harvard University Press.
Lee, J.-O., & Kim, Y.-M. (2013). A Study on the Impact of the App-Book Purchasing Behavior of Smart phone Users in Korea. The Journal of Society for e-Business Studies. Society for e-Business Studies. https://doi.org/10.7838/jsebs.2013.18.3.045
Leithwood, K., & Jantzi, D. (2006). Transformational school leadership for large-scale reform. Journal of Educational Administration, 44(4), 362–379.
Marshall, Jordan M., Burks, Roger A., Storer, Andrew J. (2004). Bucharest Early Intervention Project Core Group. A comparison of the electroencephalogram between institutionalized and community children in Romania. J Cogn Neurosci. 2004 Oct;16(8):1327-38.

Maruping, L. M., Bala, H., Venkatesh, V., & Brown, S. A. (2017). Going beyond intention: Integrating behavioral expectation into the unified theory of acceptance and use of technology. Journal of the Association for Information Science and Technology, 68(3), 623–637.
Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge University Press.
Mayo, E. (1933). The human problems of an industrial civilization. Macmillan.
Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2014). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. U.S. Department of Education.
Meng, W. (2024). A systematic review of the effectiveness of online learning during the pandemic. Frontiers in Education. Frontiers
Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook. Sage.
Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054.
Mishra, S., Gupta, R., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. International Journal of Educational Research Open, 1, 100012.
Moore, M. G., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? The Internet and Higher Education, 14(2), 129–135.
Nesti, V. A., et al. (2023). Konsep dasar pengelolaan satuan Pendidikan
OECD. (2018). The future of education and skills: Education 2030.
Oluwaseun Kolade, Adebowale Owoseni. (2022). Employment 5.0: The work of the future and the future of

work. Technology in Society, Volume 71, November 2022, 102086
Pan, Z. (2024). A systematic review of learning analytics. Journal of Learning Analytics. Learning Analytics
Padmini, K. H., and B. P. A. Tyagita. (2015). Teknologi PendidikanSebagai Pembelajaran Kompetitif Untuk Meningkatkan PrestasiSiswa: Studi Kasus Di Salah Satu SMA Di Salatiga," Pros.Semin. Nas. Pendidik., no. November, p. 60.
Permendiknas. (2007). Peraturan Menteri Pendidikan Nasional Republik Indonesia, Nomor 16 Tahun 2007 Tentang Standar Kualifikasi Akademik Dan Kompetensi Guru Yang Maha Esa Menteri Pendidikan Nasional
Piaget, J. (1973). To understand is to invent: The future of education. Grossman.
Pozas, M., et al. (2022). Exploring teachers' technology readiness profiles. Frontiers in Education. Frontiers
Razavi, Maryam Najafian., Iverson, Lee. (2006). Design Guidelines for an Information Privacy Management System for Personal Learning Spaces. In T. Reeves & S. Yamashita (Eds.), Proceedings of E-Learn 2006--World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education (pp. 2232-2239). Honolulu, Hawaii, USA: Association for the Advancement of Computing in Education (AACE).
Robbins, S. P., & Coulter, M. (2018). Management (14th ed.). Pearson.
Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.
Sallis, E. (2014). Total quality management in education (4th ed.). Routledge.
Schifter, D. E., & Ajzen, I. (1985). Intention, perceived control, and weight loss: An application of the theory of planned behavior. Journal of Personality and Social Psychology, 49(3), 843–851.
Selwyn, N. (2016). Education and technology: Key issues and debates (2nd ed.). Bloomsbury.
Siemens, G. (2014). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1), 3–10.
Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. EDUCAUSE Review, 46(5), 31–40.
Skaalvik, E. M., & Skaalvik, S. (2017). Teacher stress and teacher self-efficacy as predictors of engagement, emotional exhaustion, and motivation to leave the teaching profession. Creative Education, 8(13), 1785–1799.
Sledgianowski, D., & Mitchell, P. (2008). Social and organizational influences on technology adoption. Journal of Information Technology Teaching and Practice, 6(1), 47-65.
Stephen, A.T. (2016) The Role of Digital and Social Media Marketing in Consumer Behavior. Current Opinion in Psychology, 10, 17-21.
Sugiyono. (2017). Metode penelitian bisnis: pendekatan kuantitatif, kualitatif, kombinasi, dan R&D. Penerbit CV. Alfabeta: Bandung 225 (87). 48-61.
Sweller, J. (2011). Cognitive load theory. Psychology of Learning and Motivation, 55, 37–76.
Syafriadi, A., et al. (2022). Konsep dasar manajemen pendidikan
Syaifudin, M., & Gusrianto, D. (2023). Manajemen strategis dalam lembaga pendidikan
Taiwo, A.A., & Downe, A.G. (2013). The Theory Of User Acceptance And Use Of Technology (UTAUT) : A Meta-Analytic Review Of Empirical Findings 1.
Taylor, F. W. (1911). The principles of scientific management. Harper & Brothers.
Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models.

Information Systems Research, 6(2), 144–176.

Teo, H. H. (2011). Factors influencing the intention to use an e-learning system: A study of Singaporean university students. Computers & Education, 56(4), 1097-1107. https://doi.org/10.1016/j.compedu.2010.11.013

Teo, T., Ursavas, Ö. F., & Bahçekapili, E. (2015). An assessment of pre-service teachers' technology acceptance in Turkey: A structural equation modeling approach. The Asia-Pacific Education Researcher, 24(1), 21–31.

UNESCO. (2023). Report on education and COVID-19: Inequality and technology dependence (discussed in media synthesis). Axios

U.S. Department of Education. (2023). Artificial Intelligence and the Future of Teaching and Learning (policy report

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425-478. https://doi.org/10.2307/30036540

Vincenzo Esposito Vinzi, Wynne W. Chin, Jörg Henseler, H. W. (2010). Testing moderating effects in PLS path models: an illustration of available procedures. in the handbook of partial least squares. In Handbook of Partial Least Squares.

Virkar, Shefali., Edelmann, Noella., Hynek, Nicole., Parycek, Peter., Steiner, Gerald., Zenk, Lukas. (2019). Digital Transformation in Public Sector Organisations: The Role of Informal Knowledge Sharing Networks and Social Media. Lecture Notes in Computer Science, vol 11686. Springer, Cham.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Wang, S. (2024). Artificial intelligence in education: A systematic literature review. Expert Systems with Applications. ScienceDirect

Warsita, Bambang. (2013). Evaluasi media pembelajaran sebagaipengendalian kualitas. Jurnal Teknodik. Vol. 17, Nomor 4.

Westerman, G., Calméjane, C., & Bonnet, D., Ferraris, P., & McAfee, A. (2011). Digital Transformation: A roadmap for billion-dollar organizations. MIT Center for Digital Business and Capgemini Consulting, 1(1–68).

Wong, K. K. K.-K. (2013). Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS. Marketing Bulletin, 24(1), 1–32.

Woodward, J. (1958). Management and technology. H.M. Stationery Office.

Wren, D. A. (2018). The history of management thought (8th ed.). Wiley.

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. Computers in Human Behavior, 26(4), 760–767.