



The Influence of Digital Literacy and Classroom Climate on Learning Outcomes Through Self-Efficacy as a Mediating Variable

Haniyyah Hidayatur Rohmah^{1*}, Mohamad Arief Rafsanjani²
Universitas Negeri Surabaya

Corresponding Author: Haniyyah Hidayatur Rohmah

haniyyahhidayatur.22025@mhs.unesa.ac.id

ARTICLE INFO

Kata Kunci: Digital Literacy, Classroom Climate, Self-Efficacy, Learning Outcomes, SEM-PLS

Received : 6 April 2026

Revised : 25 May 2026

Accepted: 26 June 2026

©2026 Rohmah, Rafsanjani: This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).



ABSTRAK

This study aims to analyze the influence of digital literacy and classroom climate on learning outcomes through students' self-efficacy in Economics. The study uses a quantitative approach with SEM-PLS analysis. The results show that digital literacy and classroom climate have a positive and significant effect on both learning outcomes and students' self-efficacy. In addition, self-efficacy also has a positive and significant effect on learning outcomes and can mediate the influence of digital literacy and classroom climate on students' learning outcomes. Therefore, digital literacy, classroom climate, and self-efficacy play an important role in improving students' learning outcomes

INTRODUCTION

Education plays an important role in improving the quality of human resources, which is partly reflected in students' learning outcomes. However, Indonesian students' learning achievements are still below the international average according to the 2022 PISA results. A similar situation is also found at SMA Negeri 10 Surabaya, where more than half of the students have not reached the Learning Achievement Criteria (KKTP) in Economics. Observations show that there are still differences in digital literacy skills, self-efficacy levels, and classroom climate conditions, which are suspected to affect students' learning outcomes.

Based on Bandura's social cognitive theory, learning outcomes are influenced by the interaction between personal factors and environmental factors. Therefore, this study examines the effect of digital literacy as a personal factor and classroom climate as an environmental factor on learning outcomes through self-efficacy as a mediating variable. The contribution of this study is to provide a more comprehensive understanding of the relationships between variables in the context of face-to-face learning in the digital era. The novelty of this research lies in integrating digital literacy, classroom climate, and self-efficacy into a single research model based on social cognitive theory to explain students' learning outcomes.

IMPLEMENTATION AND METHOD

This research was conducted at SMA Negeri 10 Surabaya during the even semester of the 2024/2025 academic year, involving 11th-grade students as research subjects. The respondents were selected using proportionate stratified random sampling, resulting in a sample of ... students (adjust according to the study's sample size). Data was collected after obtaining permission from the school by distributing questionnaires to the respondents and documenting students' learning outcomes obtained from the Economics teacher.

The method used in this study is quantitative research with an explanatory research approach. Primary data was obtained through questionnaires measuring digital literacy, classroom climate, and self-efficacy using a Likert scale. The research instruments were adopted from previous studies that had been tested for validity and reliability, and then re-tested using IBM SPSS Statistics before being used in the study. Secondary data, in the form of students' learning outcomes, was obtained through documentation from the Economics subject teacher, covering test scores from four subtopics. After that, all the data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) via SmartPLS to examine both direct and indirect relationships between the research variables

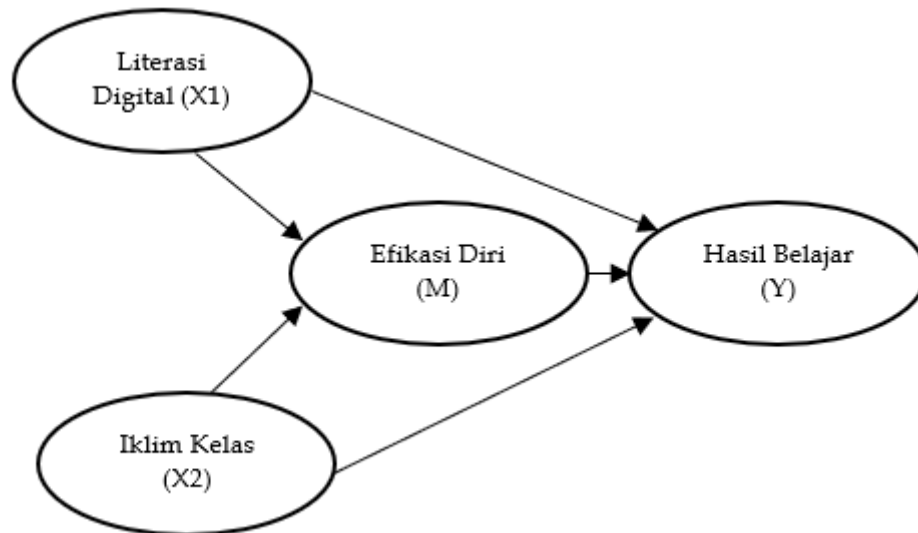


Figure 1. Conceptual Framework

RESULTS AND DISCUSSION

Data analysis was carried out using Structural Equation Modeling-Partial Least Squares (SEM-PLS) with the help of the SmartPLS 4 application. The analysis stages included evaluating the measurement model (outer model) and the structural model (inner model) before conducting hypothesis testing. Evaluasi Model Struktural (Inner Model)

Structural model evaluation is done to find out how well the model can explain the relationships between research variables. The testing is carried out through R-Square (R^2) values, Effect Size (f^2), Predictive Relevance (Q^2), and Path Coefficient.

The test results showed that the R-Square value for the Self-Efficacy variable was 0.680 (Adjusted $R^2 = 0.677$), while for the Learning Outcomes variable it was 0.703 (Adjusted $R^2 = 0.698$). These values indicate that digital literacy and classroom climate can explain 68.0% of the variation in self-efficacy, while digital literacy, classroom climate, and self-efficacy can explain 70.3% of the variation in learning outcomes. The rest is influenced by other factors outside of the research model.

Next, the Effect Size (f^2) test shows that the impact of self-efficacy on learning outcomes falls into the medium category (0.157). The influence of classroom climate on self-efficacy is in the large category (1.126), while its effect on learning outcomes is in the medium category (0.227). Additionally, the effect of digital literacy on self-efficacy is in the large category (1.201), while on learning outcomes it is in the medium category (0.192). These results indicate that digital literacy and classroom climate have a strong contribution in shaping students' self-efficacy.

Testing Predictive Relevance (Q^2) resulted in a value of 0.674 for the self-efficacy variable and 0.649 for the learning outcomes variable. Since both values are greater than zero, it means the research model has good predictive ability in explaining the relationships between the variables studied.

Hypothesis Testing

Hypothesis testing is done using the bootstrapping technique. The hypothesis is considered accepted if the t-statistics value > 1.96 and the p-value < 0.05 .

Hypotesis	Variable Relationship	t-statistics	p-values	Decision
H1	Self-Efficacy → Learning Outcomes	5,516	0,000	Accepted
H2	Digital Literacy → Learning Outcomes	5,479	0,000	Accepted
H3	Digital Literacy → Self-Efficacy	13,940	0,000	Accepted
H4	Class Climate → Learning Outcomes	6,921	0,000	Accepted
H5	Class Climate → Self-Efficacy	13,721	0,000	Accepted
H6	Digital Literacy → Self-Efficacy → Learning Outcomes	5,093	0,000	Accepted
H7	Class Climate → Self-Efficacy → Learning Outcomes	5,195	0,000	Accepted

The test results show that all the research hypotheses were accepted because they have t-statistics values greater than 1.96 and p-values of 0.000 (< 0.05). These results indicate that self-efficacy, digital literacy, and classroom climate positively affect student learning outcomes. In addition, digital literacy and classroom climate also positively influence self-efficacy. Self-efficacy is proven to mediate the effect of both digital literacy and classroom climate on student learning outcomes.

The Influence of Personal Factors on Learning Outcomes

Research shows that digital literacy and self-efficacy positively impact students' learning outcomes. In addition, digital literacy also positively affects self-efficacy. These findings suggest that students' ability to use digital technology not only helps them access information and understand learning material, but also boosts their confidence in completing academic tasks. When students can use digital technology effectively, they tend to be more confident, engaged in the learning process, and less likely to give up when facing difficulties. This, in turn, ultimately leads to better learning outcomes.

Observations at SMA Negeri 10 Surabaya show that there are differences in students' abilities to use digital technology during learning. Some students have been using digital devices to look for references, access learning materials, and complete assignments independently. However, there are still students who use their phones for activities unrelated to learning, making them less focused during lessons. In addition, there are differences in students' confidence levels, where some actively ask questions and share opinions, while others are still hesitant to participate because they are not confident in their abilities. This situation shows

that good digital literacy can shape self-efficacy, which in turn contributes to improved learning outcomes.

This finding supports Bandura's Social Cognitive Theory, which explains that personal factors, like an individual's skills and beliefs, influence learning behavior and academic success. Students' ability to use digital technology provides mastery experiences that strengthen self-efficacy, encouraging them to be more active, persistent, and able to achieve optimal learning outcomes.

The Influence of Environmental Factors on Learning Outcomes

Besides personal factors, this study also shows that the classroom climate has a positive effect on both learning outcomes and students' self-efficacy. These results suggest that a supportive learning environment can create an atmosphere that encourages students to engage in the learning process while also boosting their confidence in their own abilities.

Based on observations at SMA Negeri 10 Surabaya, there are differences in classroom climates. In some classes, there's a positive relationship among students, creating a comfortable learning atmosphere where they respect each other and feel encouraged to actively discuss or share opinions. On the other hand, in other classes, there are still instances of teasing towards active students, making some of them choose to stay quiet and reluctant to participate in learning. Besides that, the physical condition of the classrooms also varies. Some classrooms have good lighting and air circulation, creating a comfortable learning environment, while others feel hotter and less bright, which makes it harder for students to concentrate. These differences show that the learning environment, both socially and physically, affects students' comfort, engagement, and confidence in learning.

The results of this study are in line with Bandura's Social Cognitive Theory, which states that the environment is one of the factors that influence individual behavior. A learning environment that provides positive support allows students to have better learning experiences, improve self-efficacy, and encourage the achievement of more optimal learning outcomes.

The Role of Self-Efficacy as a Mediating Variable

Research results show that self-efficacy can mediate the influence of digital literacy and classroom climate on student learning outcomes. This indicates that improving learning outcomes is not only directly affected by digital literacy skills or classroom climate but also through the increased confidence of students in their own abilities.

Students who have good digital literacy skills will find it easier to use various learning resources, making them feel more capable of completing academic tasks. Similarly, students who study in a supportive classroom environment will feel safer, more comfortable, and get support from both teachers and peers. These positive experiences boost students' self-efficacy, so they become more confident, active in learning, and less likely to give up when facing academic challenges. As a result, their learning outcomes improve.

These findings reinforce the concept of reciprocal determinism in Bandura's Social Cognitive Theory, which explains that personal factors, environmental

factors, and behavior influence each other reciprocally. In this study, digital literacy represents personal factors, classroom climate represents environmental factors, while self-efficacy acts as a psychological mechanism connecting these two factors with learning outcomes. Therefore, improving students' learning outcomes is not enough by just providing technology or creating a conducive learning environment; it also needs efforts to build students' confidence in their own abilities.

CONCLUSION AND RECOMMENDATIONS

Based on the research that has been conducted, it can be concluded that digital literacy, classroom climate, and self-efficacy have a positive impact on students' learning outcomes. Digital literacy and classroom climate also positively affect students' self-efficacy. In addition, self-efficacy can mediate the influence of digital literacy and classroom climate on students' learning outcomes.

This research shows that students' ability to use digital technology, a supportive classroom environment, and students' confidence in their own abilities play an important role in supporting the learning process and improving student achievement. Therefore, the better the digital literacy, classroom climate, and self-efficacy students have, the better the learning outcomes they will achieve.

Based on the research results, a few recommendations that can be given are as follows.

1. For schools, it's necessary to enhance support for digital-based learning by providing adequate facilities, such as stable internet access, computer labs, and a Learning Management System (LMS), while also creating a classroom environment that is conducive so that the learning process can run more effectively.
2. For teachers, it is suggested to integrate digital technology into teaching and create an interactive, supportive classroom atmosphere that values students' participation. Teachers also need to give all students equal opportunities to ask questions, discuss, and express their opinions, which can boost self-efficacy and learning outcomes.
3. For students, it is necessary to use digital technology more wisely as a learning resource, increase participation in learning activities, and build confidence to ask questions, discuss, and complete assignments independently.
4. For future researchers, it is suggested to develop studies by adding other variables that might affect learning outcomes, such as learning motivation, self-regulated learning, or parental support, and to apply research to different education levels or subjects to get more comprehensive findings.

ACKNOWLEDGMENT

The author would like to express gratitude to Allah SWT for all the blessings, grace, and ease granted, allowing this research to be completed successfully. The author also thanks their parents and family for the prayers, support, and motivation always given throughout the research process. Thanks are also extended to the supervising lecturer for their guidance, direction, and valuable input, as well as to SMA Negeri 10 Surabaya, especially the principal,

Economics teachers, and all students who were willing to participate as respondents, making this research possible. In addition, the author thanks friends and colleagues who have provided support, encouragement, and assistance during the preparation of this research.

REFERENCES

- Andrade, C. (2021). A Student's Guide to the Classification and Operationalization of Variables in the Conceptualization and Design of a Clinical Study: Part 1. *Indian Journal of Psychological Medicine*, 43(2), 177-179. <https://doi.org/10.1177/0253717621994334>
- Astin, A. W. (1993). What Matters in College: Four Critical Years Revisited. *Educational Researcher*, 22(8), 32. <https://doi.org/10.2307/1176821>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Advances in Behaviour Research and Therapy*, 1(4), 139-161. [https://doi.org/10.1016/0146-6402\(78\)90002-4](https://doi.org/10.1016/0146-6402(78)90002-4)
- Bandura, A. (1978). Self-efficacy: Toward a unifying theory of behavioral change. *Advances in Behaviour Research and Therapy*, 1(4), 139-161. [https://doi.org/https://doi.org/10.1016/0146-6402\(78\)90002-4](https://doi.org/https://doi.org/10.1016/0146-6402(78)90002-4)
- Bandura, A. (1991). Social Cognitive Theory of Self-Regulation. *Organizational Behavior and Human Decision Processes*, 38, 248-287.
- Bandura, A. (1997). Self efficacy The Exercise of Control. Henry Holt and Company. <https://psycnet.apa.org/record/1997-08589-000>
- Bas, G. (2025). Understanding the role of positive classroom climate on student academic achievement through peer-social interactions and motivation to learn. *Springer Nature Link*, 40, 85. <https://link.springer.com/article/10.1007/s10212-025-00988-w>
- Castro, C., Barata, M. C., & Alexandre, J. (2025). Does school climate affect students' social and emotional skills? The importance of relationships (Vol. 8). Springer Netherlands.
- Chai, J., & Ye, J. H. (2024). A social network analysis of college students' online learning during the epidemic era: A triadic reciprocal determinism perspective. *Heliyon*, 10(6). <https://doi.org/10.1016/j.heliyon.2024.e28107>
- Costa, A., Moreira, D., Casanova, J., Azevedo, Â., Gonçalves, A., Oliveira, Í., Azevedo, R., & Dias, P. C. (2024a). Determinants of academic achievement from the middle to secondary school education: A systematic review. In *Social Psychology of Education* (Vol. 27, Issue 6). <https://doi.org/10.1007/s11218-024-09941-z>
- Costa, A., Moreira, D., Casanova, J., Azevedo, Â., Gonçalves, A., Oliveira, Í., Azevedo, R., & Dias, P. C. (2024b). Determinants of academic achievement from the middle to secondary school education: A systematic review. In *Social Psychology of Education* (Vol. 27, Issue 6). Springer Netherlands. <https://doi.org/10.1007/s11218-024-09941-z>
- Creswell, J. W. (2009). RESEARCH DESIGN. SAGE Publications, Inc.
- Curtis, A. C., & Keeler, C. (2021). Measurement in Nursing Research. *American Journal of Nursing*, 121(6), 56-60. <https://doi.org/10.1097/01.NAJ.0000753668.78872.0f>

- Dalgıç, A., Yaşar, E., & Demir, M. (2024). ChatGPT and learning outcomes in tourism education: The role of digital literacy and individualized learning. *Journal of Hospitality, Leisure, Sport and Tourism Education*, 34(January), 1–13. <https://doi.org/10.1016/j.jhlste.2024.100481>
- Derakhshan, A., Fathi, J., Pawlak, M., & Kruk, M. (2024). Classroom social climate, growth language mindset, and student engagement: the mediating role of boredom in learning English as a foreign language. *Journal of Multilingual and Multicultural Development*, 45(8), 3415–3433. <https://doi.org/10.1080/01434632.2022.2099407>
- Dhillon, S., & Padmanabhan, J. (2024). Exploring the Conceptual Understanding of Digital Literacy : a. *Humanities and Social Science Studies*, 12(December 2023), 65–74.
- Eilertsen, E. M., Malanchini, M., Domingue, B. W., Boomsma, D. I., Bergen, E. Van, & Breen, G. (2022). Estimating effects of parents' cognitive and non-cognitive skills on offspring education using polygenic scores. <https://doi.org/10.1038/s41467-022-32003-x>
- Ertesvåg, S. K., Havik, T., Vaaland, G. S., & Lerang, M. S. (2024). Teachers' instructional support and students' peer relationships in the classroom. *Teachers and Teaching: Theory and Practice*. <https://doi.org/10.1080/13540602.2024.2389394>
- Getenet, S., Cantle, R., Redmond, P., & Albion, P. (2024a). Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. *International Journal of Educational Technology in Higher Education*, 21(1). <https://doi.org/10.1186/s41239-023-00437-y>
- Getenet, S., Cantle, R., Redmond, P., & Albion, P. (2024b). Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. *International Journal of Educational Technology in Higher Education*, 21(1). <https://doi.org/10.1186/s41239-023-00437-y>
- Ghozali, I., & Kusumadewi, K. A. (2023). *SmartPLS 4.0: Konsep, Teknik, dan Aplikasi untuk Penelitian Empiris*.
- Goagoses, N., Suovuo, T. "bgt," Winschiers-Theophilus, H., Suero Montero, C., Pope, N., Rötönen, E., & Sutinen, E. (2024). A systematic review of social classroom climate in online and technology-enhanced learning environments in primary and secondary school. *Education and Information Technologies*, 29(2), 2009–2042. <https://doi.org/10.1007/s10639-023-11705-9>
- Gordon, D., Blundell, C., Mills, R., & Bourke, T. (2023). Teacher self-efficacy and reform: a systematic literature review. *Australian Educational Researcher*, 50(3), 801–821. <https://doi.org/10.1007/s13384-022-00526-3>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022a). A Primer on Partial Least Squares Structural Equation Modeling. In *Long Range Planning* (Vol. 46, Issues 1–2). <https://doi.org/10.1016/j.lrp.2013.01.002>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022b). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (N. Tiwari & G. Mahindra (eds.); Third Edit). SAGE Publications, Inc. <https://lcn.loc.gov/2021004786>

- Hanaysha, J. R., Shriedeh, F. B., & In'airat, M. (2023). Impact of classroom environment, teacher competency, information and communication technology resources, and university facilities on student engagement and academic performance. *International Journal of Information Management Data Insights*, 3(2). <https://doi.org/10.1016/j.jjimei.2023.100188>
- Hargreaves, A., & Fink, D. (2006). Redistributed Leadership for Sustainable Professional Learning Communities. *Journal of School Leadership*, 16(5), 550-565. <https://doi.org/10.1177/105268460601600507>
- Hasty, L. M., Quintero, M., Li, T., Song, S., & Wang, Z. (2023). The longitudinal associations among student externalizing behaviors, teacher-student relationships, and classroom engagement. *Journal of School Psychology*, 100(April 2022), 1-16. <https://doi.org/10.1016/j.jsp.2023.101242>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hinduja, P., Fakir Mohammad, R., & Siddiqui, S. (2024). Factors Influencing Students' Academic Self-Efficacy in Related Domains. *SAGE Open*, 14(4). <https://doi.org/10.1177/21582440241289738>
- Holm, P. (2025). Impact of digital literacy on academic achievement: Evidence from an online anatomy and physiology course. *E-Learning and Digital Media*, 22(2), 139-155. <https://doi.org/10.1177/20427530241232489>
- Hong, F. Y., Chiu, S. I., Huang, D. H., & Chiu, S. L. (2021). Correlations Among Classroom Emotional Climate, Social Self-Efficacy, and Psychological Health of University Students in Taiwan. *Education and Urban Society*, 53(4), 446-468. <https://doi.org/10.1177/0013124520931458>
- Honicke, T., Broadbent, J., & Fuller-Tyszkiewicz, M. (2023). The self-efficacy and academic performance reciprocal relationship: the influence of task difficulty and baseline achievement on learner trajectory. *Higher Education Research and Development*, 42(8), 1936-1953. <https://doi.org/10.1080/07294360.2023.2197194>
- Huang, C. H. (2021). Using pls-sem model to explore the influencing factors of learning satisfaction in blended learning. *Education Sciences*, 11(5). <https://doi.org/10.3390/educsci11050249>
- Ibrahim, R. K., & Aldawsari, A. N. (2023). Relationship between digital capabilities and academic performance: the mediating effect of self-efficacy. *BMC Nursing*, 22(1). <https://doi.org/10.1186/s12912-023-01593-2>
- Jeon, J., & Kim, S. (2022). The mediating effects of digital literacy and self-efficacy on the relationship between learning attitudes and Ehealth literacy in nursing students: A cross-sectional study. *Nurse Education Today*, 113(July 2021). <https://doi.org/10.1016/j.nedt.2022.105378>
- Jung, K. R., Zhou, A. Q., & Lee, R. M. (2017). Self-efficacy, self-discipline and academic performance: Testing a context-specific mediation model. *Learning and Individual Differences*, 60, 33-39. <https://doi.org/10.1016/j.lindif.2017.10.004>

- Kawafha, M., Al Maghaireh, D., Shawish, N., Abu Kamel, A., Al Kofahi, A., Sheyab, H., & Alsaqer, K. (2024). The effect of malnutrition on students' academic performance: Roy's model application. *Nutrition and Food Science*, 54(4), 795–804. <https://doi.org/10.1108/NFS-12-2023-0294>
- KREJCIE, R. V., & MORGAN, D. W. (1997). DETERMINING SAMPLE SIZE FOR RESEARCH ACTIVITIES. *EDUCATIONAL AND PSYCHOLOGICAL MEASUREMENT*, 30, 607–610. <https://doi.org/10.4324/9780203017852-23>
- Kurniawati, F. N. A. (2022). Meninjau Permasalahan Rendahnya Kualitas Pendidikan Di Indonesia Dan Solusi. *Academy of Education Journal*, 13(1), 1–13. <https://doi.org/10.47200/aoej.v13i1.765>
- Kyriakides, L., Christoforou, C., & Charalambous, C. Y. (2013). What matters for student learning outcomes: A meta-analysis of studies exploring factors of effective teaching. *Teaching and Teacher Education*, 36, 143–152. <https://doi.org/10.1016/j.tate.2013.07.010>
- Lay, V., & Tagniguchi, K. (2025). School-level and student-level factors influencing lower secondary student achievement in Cambodia. *Journal of International Cooperation in Education*. <https://doi.org/10.1108/jice-04-2024-0022>
- Leoni, S. (2025). A Historical Review of the Role of Education: From Human Capital to Human Capabilities. *Review of Political Economy*, 37(1), 227–244. <https://doi.org/10.1080/09538259.2023.2245233>
- Li, R., Shao, J., & Gao, D. (2025). The impact of digital literacy on the health behavior of rural older adults: evidence from China. *BMC Public Health*, 25(1). <https://doi.org/10.1186/s12889-025-21964-5>
- Li, Z., & Li, Q. (2025). The effects of school climate on students' creativity: The mediating role of growth mindset and self-efficacy. *Thinking Skills and Creativity*, 57(April). <https://doi.org/10.1016/j.tsc.2025.101851>
- Liu, R., Jong, C., & Fan, M. (2024). Reciprocal relationship between self-efficacy and achievement in mathematics among high school students: First author. *Large-Scale Assessments in Education*, 12(1). <https://doi.org/10.1186/s40536-024-00201-2>
- Longobardi, S., Pagliuca, M. M., & Regoli, A. (2022). School climate and academic performance of Italian students: the role of disciplinary behaviour and parental involvement. *Statistical Methods and Applications*, 31(5), 1355–1373. <https://doi.org/10.1007/s10260-022-00632-7>
- López, V., Torres-Vallejos, J., Ascorra, P., Villalobos-Parada, B., Bilbao, M., & Valdés, R. (2018). Construction and validation of a classroom climate scale: a mixed methods approach. *Learning Environments Research*, 21(3), 407–422. <https://doi.org/10.1007/s10984-018-9258-0>
- Luo, T., & Derakhshan, A. (2024). Examining the role of classroom climate and teacher-student relationships in EFL students' perceived learning outcomes: A self-determination theory perspective. *Learning and Motivation*, 88(1), 1–11. <https://doi.org/10.1016/j.lmot.2024.102062>
- Ma, Y., & Wei, C. (2022). The relationship between perceived classroom climate and academic performance among English-major teacher education

- students in Guangxi, China: The mediating role of student engagement. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.939661>
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, 58(1), 593–614. <https://doi.org/10.1146/annurev.psych.58.110405.085542>
- Martin, A. (2006). A european framework for digital literacy. *Nordic Journal of Digital Literacy*, 1(2), 151–161. <https://doi.org/10.18261/issn1891-943x-2006-02-06>
- Martínez-mesa, J., González-chica, D. A., Duquia, R. P., Bonamigo, R. R., & Bastos, J. L. (2016). Special a rticle sampling : how to select participants in my research study ? *Special Article*, 91(3), 326–330. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4938277/pdf/abd-91-03-0326.pdf>
- McLure, F. I., Fraser, B. J., & Koul, R. B. (2022). Structural relationships between classroom emotional climate, teacher–student interpersonal relationships and students’ attitudes to STEM. *Social Psychology of Education*, 25(2–3), 625–648. <https://doi.org/10.1007/s11218-022-09694-7>
- Middleton, L., Hall, H., & Raeside, R. (2019). Applications and applicability of Social Cognitive Theory in information science research. *Journal of Librarianship and Information Science*, 51(4), 927–937. <https://doi.org/10.1177/0961000618769985>
- Montero-Montero, D., López-Martínez, P., Martínez-Ferrer, B., & Moreno-Ruiz, D. (2021). The mediating role of classroom climate on school violence. *International Journal of Environmental Research and Public Health*, 18(6), 1–8. <https://doi.org/10.3390/ijerph18062790>
- N. Law, Woo, D. J., & Wong, G. (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2. UNESCO Institute for Statistics, 51, 146.
- Nascimbeni, F., & Vosloo, S. (2019). Digital literacy for children: Exploring definitions and frameworks. *United Nations Children’s Fund (UNICEF)*, 01, 1–49.
- Nazifi, M., Alami, N. H., & Sorkhabi, N. (2023). Fathers’ parenting style and academic achievement of emerging adults in Lebanon: Mediating roles of psychological control, self-esteem, and self-construal. *Children and Youth Services Review*, 155. <https://doi.org/10.1016/j.childyouth.2023.107218>
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers and Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- OECD. (2022). PISA PISA 2022. *Journal Pendidikan*, 10. <https://www.oecd.org/publication/pisa-2022-results/country-notes/malaysia-1dbe2061/>
- Pan, F., Zhu, G., Sui, W., & Fu, M. (2024). The effects of peer interaction on learning outcome of college students in digital environment – The chain-mediated role of attitude and self-efficacy. *Studies in Educational Evaluation*, 83(July), 1–10. <https://doi.org/10.1016/j.stueduc.2024.101404>

- Podiya, J. K., Navaneetham, J., & Bhola, P. (2025). Influences of school climate on emotional health and academic achievement of school-going adolescents in India: a systematic review. *BMC Public Health*, 25(1). <https://doi.org/10.1186/s12889-024-21268-0>
- Prananto, K., Cahyadi, S., Lubis, F. Y., & Hinduan, Z. R. (2025). Perceived teacher support and student engagement among higher education students - a systematic literature review. *BMC Psychology*, 13(1). <https://doi.org/10.1186/s40359-025-02412-w>
- Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2023). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments*, 31(4), 2371–2391. <https://doi.org/10.1080/10494820.2021.1884886>
- Ramírez Hernández, F., Durón-Ramos, M. F., García-Vázquez, F. I., Chacón-Andrade, E. R., & Lobos Rivera, M. E. (2024). Effects of classroom climate and eudaimonic well-being on student engagement in Mexico and El Salvador. *International Journal of Educational Research Open*, 7(March), 4–9. <https://doi.org/10.1016/j.ijedro.2024.100349>
- Rød, A. J., & Calafato, R. (2023). Exploring the relationship between extramural English, self-efficacy, gender, and learning outcomes: A mixed-methods study in a Norwegian upper-secondary school. *Studies in Educational Evaluation*, 79(May), 0–1. <https://doi.org/10.1016/j.stueduc.2023.101302>
- Rodríguez, A. M. M., & Kyriakides, L. (2022). What matters for student learning outcomes? A systematic review of studies exploring system-level factors of educational effectiveness. *Review of Education*. <https://doi.org/https://doi.org/10.1002/rev3.3374>
- Rong, R., & Yang, H. (2024). Study on the influencing factors of digital literacy among normal students under the background of big data. *ACM International Conference Proceeding Series*, 121–126. <https://doi.org/10.1145/3696500.3696520>
- Sahir, S. H. (2022). *METODOLOGI PENELITIAN* (Tri Koryati (ed.); 1st, Mei 202 ed.). PENERBIT KBM INDONESIA.
- Saptutyningasih, E., & Setyaningrum, E. (2019). *Penelitian Kuantitatif Metode dan Alat Analisis (Pertama)*. Gosyen Publishing.
- Sawitri, D. R., Hadiyanto, H., & Hadi, S. P. (2015). Pro-environmental Behavior from a SocialCognitive Theory Perspective. *Procedia Environmental Sciences*, 23(Ictcred 2014), 27–33. <https://doi.org/10.1016/j.proenv.2015.01.005>
- Schunk, D. H., & DiBenedetto, M. K. (2021). Self-efficacy and human motivation. *Advances in Motivation Science*, 8, 153–179. <https://doi.org/10.1016/bs.adms.2020.10.001>
- Schwarzer, R., & Born, A. (1997). OPTIMISTIC SELF-BELIEFS: ASSESSMENT OF GENERAL PERCEIVED SELF-EFFICACY. *World Psychology*, 3, 177–190.
- Shang, Y., & Ma, L. (2024). Classroom anxiety, learning motivation, and English achievement of Chinese college students: The mediating role of self-efficacy. *Acta Psychologica*, 251(October). <https://doi.org/10.1016/j.actpsy.2024.104550>

- Su, P., Kong, J., Zhou, L., & Li, E. (2024). The interplay of flow, self-efficacy, learning motivation, and learning outcomes in music education: A comprehensive analysis of multidimensional interactions. *Acta Psychologica*, 250(May). <https://doi.org/10.1016/j.actpsy.2024.104515>
- Sugiyono, D. (2013). *Metode Penelitian Kuantitatif, Kualitatif, dan Tindakan*.
- Tang, D., Fan, W., Zou, Y., George, R. A., Arbona, C., & Olvera, N. E. (2021). Self-efficacy and achievement emotions as mediators between learning climate and learning persistence in college calculus: A sequential mediation analysis. *Learning and Individual Differences*, 92(April). <https://doi.org/10.1016/j.lindif.2021.102094>
- Tomaszewski, W., Xiang, N., & Huang, Y. (2024). School climate, student engagement and academic achievement across school sectors in Australia. *Australian Educational Researcher*, 51(2), 667–695. <https://doi.org/10.1007/s13384-023-00618-8>
- Uchida, A., Michael, R. B., & Mori, K. (2018). An Induced Successful Performance Enhances Student Self-Efficacy and Boosts Academic Achievement. *AERA Open*, 4(4). <https://doi.org/10.1177/2332858418806198>
- van der Bijl, J. J., & Shortridge-Baggett, L. M. (2001). The theory and measurement of the self-efficacy construct. *Scholarly Inquiry for Nursing Practice*, 15(3), 189–207. <https://doi.org/10.1891/0889-7182.15.3.189>
- Van Dinther, M., Dochy, F., & Segers, M. (2011). Factors affecting students' self-efficacy in higher education. *Educational Research Review*, 6(2), 95–108. <https://doi.org/10.1016/j.edurev.2010.10.003>
- Wachs, S., Schittenhelm, C., Kops, M., & Wright, M. F. (2025). Promoting Classroom Climate and Why it Matters in Anti-Hate Speech Prevention Programs: A HateLess Evaluation Study. *Journal of Interpersonal Violence*. <https://doi.org/10.1177/08862605241308296>
- Wang, J., & Wu, Y. (2023). Income inequality, cultural capital, and high school students' academic achievement in OECD countries: A moderated mediation analysis. *British Journal of Sociology*. <https://doi.org/10.1111/1468-4446.12997>
- Wang, M. (2024). Modeling the Contributions of Perceived Teacher Autonomy Support and School Climate to Chinese EFL Students' Learning Engagement. *Perceptual and Motor Skills*, 131(5), 2008–2029. <https://doi.org/10.1177/00315125241272672>
- Wang, M. Te, L. Degol, J., Amemiya, J., Parr, A., & Guo, J. (2020). Classroom climate and children's academic and psychological wellbeing: A systematic review and meta-analysis. *Developmental Review*, 57. <https://doi.org/10.1016/j.dr.2020.100912>
- Wang, Z., Wang, L., Miao, H., Yan, R., Shi, Y., Yuan, X., Wang, N., & Wang, F. (2023). Classroom climate and creativity: The indirect effect of autonomous motivation. *Journal of Applied Developmental Psychology*, 87. <https://doi.org/10.1016/j.appdev.2023.101556>
- Watts, T. W. (2020). Academic Achievement and Economic Attainment: Reexamining Associations Between Test Scores and Long-Run Earnings. *AERA Open*, 6(2). <https://doi.org/10.1177/2332858420928985>

- Xu, S., Wang, L., Zhu, S., & Dai, Y. (2025). Exploring factors influencing digital literacy among higher vocational students based on quantitative evidence. *Scientific Reports*, 15(1). <https://doi.org/10.1038/s41598-025-04078-1>
- Yuan, X., Rehman, S., Altalbe, A., Rehman, E., & Shahiman, M. A. (2024). Digital literacy as a catalyst for academic confidence: exploring the interplay between academic self-efficacy and academic procrastination among medical students. *BMC Medical Education*, 24(1). <https://doi.org/10.1186/s12909-024-06329-7>
- Zhang, C., Rice, R. E., & Wang, L. H. (2024). College students' literacy, ChatGPT activities, educational outcomes, and trust from a digital divide perspective. *New Media and Society*. <https://doi.org/10.1177/14614448241301741>
- Zhao, W. Q., & Ma, R. (2025). Investigating the relationship between goal orientation, self-efficacy, positive emotionality, and affective engagement among Chinese students. *Acta Psychologica*, 253(January). <https://doi.org/10.1016/j.actpsy.2025.104735>
- Zhou, Q., Gidziela, A., Allegrini, A. G., Cheesman, R., Wertz, J., Maxwell, J., Plomin, R., Rimfeld, K., & Malanchini, M. (2025). Gene-environment correlation: the role of family environment in academic development. *Springer Nature*, 30(3), 999-1008. [https://doi.org/10.1038/s41380-024-](https://doi.org/10.1038/s41380-024-02716-)