

Enhancing Artificial Intelligence Literacy for AI-Integrated Social Studies Teaching

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Abstract: This study aims to examine the enhancement of literacy and competence in the use of Artificial Intelligence (AI) in the transformation of Social Sciences (IPS) learning in the Society 5.0 era. The background to this study is the still limited understanding and practical skills of students and lecturers on the Master's Programme in Social Sciences Education at the University of Lampung in integrating AI into the design, implementation and evaluation of Social Sciences learning. The study employed a quantitative approach using a one-group pre-test-post-test pre-experimental design involving 15 participants, comprising 8 students from the 2025 intake and 7 lecturers from the Master's Programme in Social Sciences Education. The intervention, comprising training and guidance on the development of AI-based social studies teaching materials and learning resources, was carried out over a full day on 8 June 2026. An assessment instrument comprising 15 multiple-choice questions based on Higher Order Thinking Skills (C4, C5, C6) was used to measure AI literacy and learning transformation abilities before and after the intervention. The research results showed that the average score increased from 54.47 (pre-test) to 86.73 (post-test), with an average N-Gain of 0.72 in the high category. A paired t-test yielded $t = 17.93$; $df = 14$; $p = 0.000$, indicating a significant difference between pre- and post-training scores. It was concluded that training in the use of AI effectively enhances the competence of students and lecturers in designing social studies learning that is adaptive to technological developments, whilst also contributing to the strengthening of the quality of social studies education in the Society 5.0 era.

Article History

Received: 10-07-2026

Review: 15-07-2026

Published: 31-07-2026

Key Words :

Artificial Intelligence;
learning transformation;
social studies education;
Society 5.0; pre-experiment.

How to Cite: Adha, M. M., Pujiati, Nugraheni, I. L., Sakung, N. T., & Perdana, D. R. (2026). Enhancing Artificial Intelligence Literacy for AI-Integrated Social Studies Teaching: Bahasa Indonesia. *Jurnal Teknologi Pendidikan : Jurnal Penelitian Dan Pengembangan Pembelajaran*, 11(3), 514–523.
<https://doi.org/10.33394/jtp.v11i3.21845>



<https://doi.org/10.33394/jtp.v11i3.21845>

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Introduction

The development of Artificial Intelligence (AI) over the past two decades has accelerated rapidly, marked by the emergence of generative AI models capable of understanding natural language, generating text and images, and even performing complex reasoning. These developments have had a transformative impact on almost every sector of life, including education, and are in line with the concept of Society 5.0, which integrates the

cyber and physical worlds to create a society that is both human-centred and technology-based (Fukuyama, 2018).

The teaching of Social Studies, as an interdisciplinary field that examines social, economic, cultural, historical and civic phenomena, faces its own challenges in adapting to developments in AI. Traditionally, Social Studies teaching has tended to emphasise conceptual understanding and the memorisation of social facts, whilst the demands of the modern world call for critical, analytical and creative thinking skills. On the other hand, AI offers great potential to enrich Social Studies education, for example through interactive simulations of historical events, real-time analysis of socio-economic data, personalised teaching materials, and automated feedback.

A preliminary study by a research team comprising students and lecturers from the Master's Programme in Social Studies Education (MPIPS) at the University of Lampung has identified that the use of AI in social studies education within the programme remains sporadic and unstructured. Understanding of the principles behind AI, the various categories of its applications, and strategies for its systematic integration into social studies curriculum design remains limited. This situation has the potential to hinder the transformation of social studies learning to make it adaptable to the demands of Society 5.0; consequently, research is required that is not merely descriptive but also provides interventions in the form of training and empirically measures their impact.

Conceptually, AI in education has been utilised in various forms, such as intelligent tutoring systems, learning analytics and educational chatbots, which ideally enhance educators' capabilities rather than replacing their role (Holmes, Bialik & Fadel, 2021). Zawacki-Richter, Marin, Bond, and Gouverneur (2019) categorised the use of AI in higher education into four categories: profiling and prediction, intelligent and adaptive tutoring systems, automated assessment, and student support systems. In the context of social sciences, Pratama and Santoso (2023) identified forms of AI integration such as chatbots for simulating dialogues with historical figures, generative AI for developing problem-based learning case studies, and data analysis tools for teaching geography and economics. However, the use of AI also faces ethical challenges, such as the accuracy and bias of information, the protection of personal data, over-reliance, and the digital divide (Holmes et al., 2021); consequently, the development of AI literacy must be accompanied by critical and ethical awareness in utilising its outputs.

This research is important because the Master's Programme in Social Studies Education has a responsibility to equip its students with competencies relevant to the needs of the times, whilst lecturers need to have an adequate understanding to become adaptive learning facilitators. Furthermore, empirical research that specifically measures the impact of AI training on the competencies of Social Studies students and lecturers using HOTS-based instruments remains limited. Based on the above, this study was designed to answer the following questions: (1) what are the levels of literacy and AI-based social studies learning transformation skills prior to the training; (2) what are these levels after the training; (3) is there a significant difference between the pre-test and post-test scores; and (4) how large is the increase (N-Gain) observed.

Research Method

This study employed a quantitative approach using a pre-experimental design in the form of a one-group pre-test–post-test design, whereby the intervention was administered to a single group of subjects without a control group, with measurements taken before and after

the intervention. This design was chosen because the aim of the study was to measure changes in AI literacy and the ability to transform social studies learning as a direct result of the training.

The research sample comprised 15 participants, consisting of 8 students from the 2025 intake of the Master's Programme in Social Studies Education (codes M-01 to M-08) and 7 lecturers from the Master's Programme in Social Studies Education (codes D-01 to D-07), selected using purposive sampling. The research was conducted at the Faculty of Teacher Training and Education, University of Lampung, Bandar Lampung, on 8 June 2026..

The research procedure comprised six stages, namely: identifying participants' needs through interviews and initial observations; developing materials and instruments through literature reviews and team focus group discussions; administering a pre-test consisting of 15 Higher-Order Thinking Skills (HOTS) questions; conducting training and mentoring sessions covering lectures, demonstrations and practical exercises in the use of AI; administering a post-test using a parallel instrument; and analysing the data and compiling a report. The training was conducted over a full day with the following programme of activities: a pre-test in the morning session; the delivery of conceptual material on AI and Society 5.0; demonstrations and practical sessions on the use of generative AI tools to develop social studies learning materials and scenarios; individual and group mentoring in the development of AI-based learning products; and a post-test at the end of the session.

Data were collected using pre-test and post-test instruments, supplemented by supporting data in the form of observation results, participants' reflective notes and documentation of activities. The data were analysed using descriptive statistics to obtain the mean, highest and lowest scores, and standard deviation; normalised N-Gain analysis (Hake, 1998) with categories of low ($g < 0.3$), moderate ($0.3 \leq g \leq 0.7$), and high ($g > 0.7$); a normality test using the Shapiro-Wilk test; and hypothesis testing using a paired t-test at a significance level of $\alpha = 0.05$.

Result and Discussion

Subject Description and Pre-test–Post-test Data

All 15 research participants took part in the full programme of activities, from the pre-test, through the training and mentoring, to the post-test, meaning there was no missing data. The complete pre-test and post-test results are presented in Table 1.

Table 1. Pretest and Posttest Results for Research Subjects

No	Kode	Pretest	Posttest	Gain	N-Gain	Category
1	M-01	50	82	32	0,64	Currently
2	M-02	47	78	31	0,58	Currently
3	M-03	57	88	31	0,72	Height
4	M-04	40	73	33	0,55	Currently
5	M-05	53	87	34	0,72	Height
6	M-06	63	93	30	0,81	Height
7	M-07	47	80	33	0,62	Currently
8	M-08	60	90	30	0,75	Height
9	D-01	53	87	34	0,72	Height

10	D-02	67	97	30	0,91	Height
11	D-03	60	93	33	0,82	Height
12	D-04	47	83	36	0,68	Currently
13	D-05	57	90	33	0,77	Height
14	D-06	63	95	32	0,86	Height
15	D-07	53	85	32	0,68	Currently

Descriptive statistics for the pre-test and post-test scores are presented in Table 2. The average score increased from 54.47 in the pre-test to 86.73 in the post-test, with an average N-Gain of 0.72, which falls into the high category.

Table 2. Descriptive Statistics for Pre-test and Post-test Scores

Statistik	Pretest	Posttest
Number of partners (N)	15	15
On average	54,47	86,73
Highest score	67	97
Lowest score	40	73
Standard deviation	7,46	6,68
Average N-Gain	0,72 (Height)	-

Normality Tests and Hypothesis Testing

A normality test using the Shapiro-Wilk test was carried out as a prerequisite for the paired t-test. The results of the normality test and the hypothesis test are presented in Table 3.

Table 3. Results of the Normality Test and Hypothesis Test (Paired t-test).

Test	Mark	Description
Pretest normality (Shapiro-Wilk)	$p = 0,182$	Normally distributed
Post-test normality (Shapiro-Wilk)	$p = 0,210$	Normally distributed
Paired t-test	$t = 17,93$; $df = 14$; $p = 0,000$	Significant differences

The pre-test and post-test data were found to be normally distributed ($p > 0.05$), so the hypothesis testing proceeded using a paired t-test. The results of the test yielded $t = 17.93$ with $df = 14$ and $p = 0.000$ ($p < 0.05$), which means that the null hypothesis was rejected and there was a significant difference between the pre-test and post-test scores.

Discussion

The research findings indicate that Artificial Intelligence (AI) literacy training brings about tangible changes to both the conceptual understanding and pedagogical capabilities of social studies teachers in utilising AI technology as part of the transformation of learning. These changes are reflected not only in improved post-test scores, but also in the shift in how participants perceive AI as a technological ecosystem with various functions in education.

Before undertaking the training, the majority of participants still held a limited perception of AI. AI was understood merely as a popular chatbot application used to answer questions or generate text. This understanding indicates that AI literacy remains at the level of functional use and has not yet reached the conceptual level that would enable teachers to critically integrate AI into the learning process. This situation is consistent with the findings of Harjun et al. (2026), who explain that the majority of Indonesian educators still face a skills gap in understanding the concept of AI as part of the curriculum transformation towards Society 5.0. These limitations in conceptual understanding mean that teachers tend to use AI as an administrative tool rather than as a pedagogical tool capable of enhancing the quality of learning.

The average increase in scores of 32.27 points from the pre-test to the post-test indicates that the training on the use of AI, held on 8 June 2026, had a positive impact on AI literacy and the ability to transform social studies learning amongst MPIPS students and lecturers. The average N-Gain score of 0.72, classified as 'high', is supported by the fact that 9 out of 15 participants (approximately 60 per cent) fell into the 'high' N-Gain category, whilst the remainder were in the 'moderate' category, and none were in the 'low' category. This indicates that the training had a consistently positive impact on all participants, both students and lecturers.

When analysed by group, the lecturers' group showed a slightly higher average N-Gain than the students' group. This is thought to be linked to the lecturers' more mature pedagogical experience in designing learning strategies, enabling them to more quickly translate new knowledge about AI into concrete learning designs. Students, although generally more familiar with digital technology in general, required a relatively longer time to link technical knowledge of AI with the pedagogical framework for social studies learning. This finding is consistent with Rahayu and Iskandar (2022), who state that teaching experience contributes to the speed at which educators adapt to integrating new technologies.

The delivery of the training brought about significant changes in the dimension of AI literacy. Participants began to understand that AI comprises various branches of technology, such as machine learning, natural language processing, computer vision, intelligent tutoring systems, predictive analytics and generative AI, each with different characteristics, functions and intended uses. This understanding indicates an improvement in participants' conceptual ability to identify the characteristics of each type of AI and its relevance to social studies learning. These findings reinforce the classification of AI in education proposed by Zawacki-Richter et al. (2019), namely AI as a learning support tool, AI as an intelligent tutor, AI for data-driven decision-making, and AI as an educational administration automation system. Participants no longer regarded all AI applications as having the same function; rather, they were able to explain the differences between generative AI, which produces new content; intelligent tutoring systems, which provide adaptive feedback; and analytical AI, which assists in processing learning data.

This shift in mindset indicates that AI literacy is evolving from merely the ability to use applications to a deeper understanding of how the technology works. Jiang et al. (2022) explain that an understanding of AI mechanisms is a crucial foundation for users to be able to utilise the technology responsibly. Users who understand AI concepts are more likely to evaluate the quality of the system's outputs, recognise the limitations of algorithms, and identify the potential for information bias. This was evident among the study participants, who began to explain that AI generates outputs based on machine learning processes using training data, rather than on human-like thinking abilities. This awareness serves as a key

indicator that the training successfully enhanced participants' conceptual understanding of AI.

The improvement in AI literacy was also reflected in the participants' ability to select AI applications suited to their social studies learning needs. Prior to the training, the use of AI had focused solely on searching for information or compiling teaching materials. After completing the training, participants began using AI to generate historical illustrations, create simulations of dialogues between national figures, devise Higher-Order Thinking Skills (HOTS)-based questions, conduct socio-economic data analysis, and even develop project assessment rubrics. This variety of applications demonstrates that participants have come to understand AI as a multifunctional technology that supports a wide range of learning activities. These findings are consistent with the study by Putra et al. (2025), which states that the transition in education from the Fourth Industrial Revolution towards Society 5.0 requires teachers to be able to select and integrate various AI technologies according to learners' needs, rather than merely operating a single specific application.

In terms of the transformation of social studies teaching, the most noticeable change was in teachers' ability to design problem-based learning (PBL) that utilises AI as a medium for exploration. Prior to the training, lesson plans were still focused on conventional delivery of content, with limited use of technology. Following the training, participants were able to develop more contextual learning scenarios, such as simulating dialogues between pupils and historical figures using AI chatbots, analysing demographic data using generative AI, exploring social change through data visualisation, and devising solutions to local economic issues with the aid of AI. These activities demonstrate that AI is no longer viewed as a source of instant answers, but rather as a tool that fosters critical thinking, investigation and problem-solving.

This capability supports the findings of Nurhariyanti (2026), which show that the use of ChatGPT in context-based social studies learning can enhance teachers' creativity in designing learning activities that are more interactive and closely aligned with pupils' lives. Social studies education is multidisciplinary in nature, requiring analysis of social, economic, political, historical and cultural phenomena. AI offers the opportunity to provide a variety of information sources, simulations and visualisations that were previously difficult to achieve through traditional teaching methods. Teachers with higher levels of AI literacy are more likely to be able to utilise this technology as a means of creating more authentic learning experiences.

The research findings also indicate that participants are beginning to integrate AI with learner-centred approaches to learning. Instructional design no longer focuses on the delivery of content, but rather on activities such as exploration, collaboration, discussion, reflection and independent problem-solving in social contexts. These characteristics are in line with the concept of Society 5.0 Education, which positions technology as a means of enhancing the quality of human life, rather than replacing the role of humans. Fukuyama (2018) explains that Society 5.0 emphasises the integration of physical and digital spaces to generate solutions geared towards the well-being of society. This perspective is reinforced by Rafsanjani (2023), who asserts that the transformation of education in the Society 5.0 era requires a paradigm shift in learning from teacher-centred to human-centred learning based on smart technology.

These changes are also consistent with the findings of Ydyrysbayev et al. (2022), who state that the digital transformation of education is determined not only by the availability of technology, but also by teachers' ability to integrate technology into their teaching strategies.

Teachers act as learning designers who are able to link digital technology to learning objectives, learners' characteristics, and the needs of 21st-century society. The training provided in this study demonstrated that improved AI competence contributes to enhancing teachers' capacity to design more innovative learning experiences.

Another area that showed improvement was ethical awareness regarding the use of AI. Prior to the training, some participants tended to accept all AI outputs without verification. After completing the training, participants demonstrated an understanding that information generated by AI requires scrutiny of its sources, the validity of the data, potential algorithmic bias, and its suitability for the learning context. Participants also began to realise the importance of transparency regarding the use of AI with learners, as well as the need to avoid over-reliance on technology. These findings support the view of Holmes et al. (2021), who identify AI ethics as a key component of educators' digital literacy. AI competence encompasses not only technical skills but also the ability to make responsible decisions regarding the use of technology.

Such ethical awareness becomes increasingly important when generative AI is used to produce learning materials, assessments, or sources of historical and social information. Information generated by AI has the potential to contain cultural or political bias, or factual errors, if it is not critically verified. Teachers with adequate AI literacy will be able to guide pupils through the process of evaluating digital information. This is in line with the study by Timotheou et al. (2023), which emphasises that a school's digital capacity is influenced by teachers' ability to foster a culture of critical digital literacy, rather than merely their mastery of technological tools.

The improvement in participants' competencies also indicates that a training model combining conceptual explanations, practical demonstrations, hands-on practice, reflective discussions and mentoring yields a stronger learning impact than a one-way information-sharing approach. Participants were given the opportunity to try out various AI applications, discuss their user experiences, and receive feedback on the learning designs they had developed. This approach is consistent with the findings of Soegiarto et al. (2023), who explain that AI-based learning innovations require practical experience to enable teachers to link technology to pedagogical needs. Mastery of technology acquired solely through lectures is insufficient for building implementation competencies.

A study by Chakraborty and Galatro (2026), based on bibliometric analysis, also shows that the global transition towards Education 5.0 is characterised by an increase in research on the integration of AI into the learning process, curriculum development, adaptive assessment, and the enhancement of teachers' competencies. AI training is viewed as a strategic investment for educational institutions, as the quality of technology implementation is heavily influenced by the readiness of human resources. This supports the findings of this study, which show that improved AI literacy correlates with an increase in teachers' ability to design innovative learning experiences.

In the context of social studies education, AI has great potential to enrich the learning experience through the analysis of social data, public policy simulations, the exploration of global issues, and evidence-based problem-solving. Rodríguez and Swalwell (2025) explain that 21st-century social studies education requires learners to be able to understand societal issues in a critical, democratic and data-driven manner. AI can serve as a tool for developing these competencies when used appropriately. This view is reinforced by Kamaruddin and Saqjuddin (2025), who emphasise that a deep learning approach in social studies education

requires the support of digital technology to enable pupils to explore information more broadly and in greater depth.

AI-based learning transformation must also remain grounded in humanistic values, character and national identity. Widiastuti et al. (2024) emphasise that the future of education in Indonesia must integrate technology with the values of Pancasila and multiculturalism. AI is positioned as a tool that supports character building, rather than replacing human interaction in education. A similar perspective is put forward by Ilyasin and Julaiha (2025), who explain that curriculum transformation requires a balance between technological innovation and the reinforcement of humanistic values so that education continues to produce graduates who are both adaptable and of good character.

Although the research results show a fairly significant improvement, several limitations must still be taken into account when interpreting the findings. The sample size comprised only fifteen participants, meaning that the generalisability of the research results remains limited to the characteristics of the sample used. Furthermore, the study design did not include a control group. The improvement in post-test scores may still have been influenced by the testing effect, prior learning experience, or participants' motivation during the training. The measurements taken also focused on short-term outcomes following the training, meaning that the sustainability of AI competencies in everyday learning practice cannot yet be comprehensively evaluated.

Further research could employ an experimental design with a control group, a larger sample size, and involve various levels of education to strengthen the study's external validity. Longitudinal observation over several months is also important to assess the consistency of AI implementation in social studies teaching practice. Future studies could develop training models based on mentoring, professional learning communities, or AI-assisted lesson study to gain a more comprehensive understanding of the effectiveness of teacher competence development in the face of educational transformation towards Education 5.0 and Society 5.0, as outlined by Harjun et al. (2026), Putra et al. (2025), Chakraborty and Galatro (2026), and Rafsanjani (2023).

Conclusion

The level of AI literacy and the ability to transform social studies learning among students and lecturers on the Master's Programme in Social Studies Education at the University of Lampung prior to the training fell into the low to moderate category, as indicated by an average pre-test score of 54.47. After participating in the AI utilisation training, the average score increased significantly to 86.73, as confirmed by the results of a paired t-test ($t = 17.93$; $df = 14$; $p = 0.000$) and an average N-Gain of 0.72 in the high category. Consequently, the AI utilisation training proved effective as a strategy for enhancing the digital competencies of students and lecturers, whilst also supporting a more innovative and adaptive transformation of social studies learning, in line with the demands of education in the Society 5.0 era. The strengthening of AI literacy needs to be carried out continuously through training programmes and curriculum development, accompanied by further research involving a control group and a larger sample size to reinforce the validity of the findings.

Acknowledgment

The organising team would like to express their gratitude to the Faculty of Teacher Training and Educational Sciences, University of Lampung, for its financial support through the FKIP UNILA DIPA for the 2026/2027 academic year; to the University of Lampung's Institute for Research and Community Service for facilitating the administrative aspects of the event; and to all students and lecturers of the Master's Programme in Social Studies Education who actively participated in this event.

References

- Chakraborty, S., & Galatro, D. (2026). Artificial intelligence (AI) induced digital transformation to Education 5.0: Bibliometric analysis captures a defining global shift. *2026 IEEE Global Engineering Education Conference (EDUCON)*, 1–9. IEEE. [10.1109/EDUCON67543.2026.11574148](https://doi.org/10.1109/EDUCON67543.2026.11574148)
- Fukuyama, M. (2018). Society 5.0: Aiming for a new human-centered society. *Japan Spotlight*, 27(5), 47–50. <https://www.jef.or.jp/journal/>
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74. <https://doi.org/10.1119/1.18809>
- Harjun, H., Lewa, J., Syata, W. M., & Wardamianingsih, W. S. F. (2026). The transformation of the artificial intelligence education curriculum in the Society 5.0 era. *Kayee: Jurnal Pendidikan dan Ilmu Sosial*, 1(2), 146–156. <https://doi.org/10.63822/k2wcq94>
- Holmes, W., Bialik, M., & Fadel, C. (2021). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.
- Ilyasin, M., & Julaiha, S. (2025). Transformation of Islamic educational institution curriculum to improve learning outcomes in facing the challenges of industrial society. *International Journal of Learning Reformation in Elementary Education*, 4(02), 207–225. <https://doi.org/10.56741/ijlree.v4i02.1005>
- Jiang, Y., Li, X., Luo, H., Yin, S., & Kaynak, O. (2022). Quo vadis artificial intelligence? *Discover Artificial Intelligence*, 2(1), Article 4. <https://doi.org/10.1007/s44163-022-00022-8>
- Kamaruddin, K., & Saqjuddin, S. (2025). Deep learning as a transformative approach to social studies education. *International Journal of Management and Education in Human Development*, 5(01), 1478–1483. <https://ijmehd.com/index.php/ijmehd/article/view/308>
- Nurhariyanti, Y. (2026). Teachers' strategies for dealing with AI: The use of ChatGPT in context-based social studies teaching in the Society 5.0 era at SMPN 61 Surabaya. *Jurnal Dialektika Pendidikan IPS*, 6(1), 114–122. <https://ejournal.unesa.ac.id/index.php/PENIPS/article/view/74393>
- Pratama, A., & Santoso, B. (2023). The use of artificial intelligence in the development of problem-based learning in social studies education. *Jurnal Pendidikan IPS Indonesia*, 7(2), 85–97. <https://doi.org/10.23887/jeu.v13i2.102231>
- Putra, I. P., Adri, M., & Irfan, D. (2025). Artificial intelligence in education: Opportunities and challenges in the transition from Industry 4.0 to Society 5.0. *Jurnal Vokasi Informatika*, 5(1), 1–14. <https://doi.org/10.24036/javit.v5i1.257>
- Rafsanjani, H. (2023). Education transformation in 5.0 society development era. In *AIP Conference Proceedings* (Vol. 2727, Article 020050). AIP Publishing. <https://doi.org/10.1063/5.0141657>

- Rahayu, S., & Iskandar, D. (2022). 21st-century learning transformation in preparation for the Society 5.0 era. *Jurnal Inovasi Pendidikan*, 9(1), 15–27. 10.31004/basicedu.v6i2.2082
- Rodríguez, N. N., & Swalwell, K. (2025). *Social studies for a better world: A guide for elementary educators*. Routledge.
- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
- Soegiarto, I., Hasnah, S., Annas, A. N., Sundari, S., & Dhaniswara, E. (2023). Inovasi pembelajaran berbasis teknologi artificial intelligences (AI) pada sekolah kedinasan di era Revolusi Industri 4.0 dan Society 5.0. *Innovative: Journal of Social Science Research*, 3(5), 10546–10555. <https://j-innovative.org/index.php/Innovative/article/view/6132>
- Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Ioannou, A., & others. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and Information Technologies*, 28(6), 6695–6726. <https://doi.org/10.1007/s10639-022-11431-8>
- Widiastuti, A., Mr, M. I. F., Widodo, S. F. A., Ahmed, T., & Shahzeb, S. (2024). Integration of Pancasila and Islamic values in Indonesia's futuristic education transformation: Multicultural analysis. *Journal of Social Studies (JSS)*, 20(2), 133–144. 10.21831/jss.v20i2.76379.133-144
- Ydyrysbayev, D., Kakimova, L., Sailaubaikyzy, B. G., Talgatbekovich, S., Urmatova, A., & Orazbaev, E. (2022). Determining the digital transformation in education in the Society 5.0 process. *International Journal of Emerging Technologies in Learning (iJET)*, 17(18), 136–145. <https://www.learntechlib.org/p/223078/>.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—Where are the educators? *International Journal of Educational Technology in Higher Education*, 16(39), 1–27. <https://doi.org/10.1186/s41239-019-0171-0>