

## INTEGRATING DIFFERENTIATED LEARNING STRATEGIES TO DEVELOP EFL STUDENTS' DIGITAL LITERACY AND SOCIO-EMOTIONAL COMPETENCE

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**Abstrak** - Penelitian ini bertujuan untuk menganalisis pengaruh penerapan strategi pembelajaran terdiferensiasi terhadap kompetensi sosioemosional (SE) dan literasi digital (DL) siswa dalam konteks pembelajaran Bahasa Inggris sebagai Bahasa Asing (EFL). Hasil analisis deskriptif menunjukkan bahwa kelompok eksperimen memperoleh peningkatan yang lebih tinggi pada kedua aspek dibandingkan kelompok kontrol, dengan skor rata-rata SE masing-masing 175,30 dan 164,70, serta skor DL 125,40 dan 109,25. Sebelum dilakukan pengujian hipotesis, data diuji menggunakan uji normalitas dan homogenitas untuk memastikan pemenuhan asumsi parametrik. Hasil uji *t* independen menunjukkan adanya peningkatan yang signifikan pada SE dan DL siswa di kelompok eksperimen ( $p = 0,000$ ), sedangkan kelompok kontrol tidak menunjukkan peningkatan yang berarti. Temuan ini membuktikan bahwa penerapan strategi pembelajaran terdiferensiasi lebih efektif dibandingkan metode konvensional dalam mengembangkan literasi digital dan kecakapan sosioemosional siswa EFL. Penelitian ini menegaskan pentingnya penerapan strategi pembelajaran yang fleksibel, interaktif, dan berpusat pada peserta didik untuk mendukung pengembangan kompetensi abad ke-21 secara holistik di era digital.

**Kata kunci:** Strategi Pembelajaran Terdiferensiasi, Kompetensi Sosioemosional, Literasi Digital, Pembelajaran EFL, Pengembangan Holistik.

**Abstract** - This study aims to examine the effect of integrating differentiated learning strategies on students' socio-emotional competence (SE) and digital literacy (DL) within English as a Foreign Language (EFL) classrooms. Descriptive analysis revealed that the experimental group achieved higher improvement in both SE and DL compared to the control group, with mean SE scores of 175.30 and 164.70, and DL scores of 125.40 and 109.25, respectively. Prior to hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met parametric assumptions. The independent-samples *t*-test results showed a significant increase in SE and DL among students in the experimental group ( $p = 0.000$ ), while the control group did not exhibit significant improvement. These findings indicate that differentiated learning strategies are more effective than traditional methods in enhancing EFL students' digital literacy and socio-emotional competence. The study underscores the importance of implementing flexible, interactive, and learner-centered approaches to support holistic student development and foster 21st-century competencies in the digital era.

**Keywords:** Differentiated Learning Strategies, Socio-Emotional Competence, Digital Literacy, EFL Learning, Holistic Development.

### 1. INTRODUCTION

In the landscape of 21st-century English language education, learners are expected to master a comprehensive set of competencies to succeed in an increasingly interconnected and technologically driven world. Among these, digital literacy and socio-emotional competence are indispensable for fostering critical thinking, effective communication, collaborative engagement, problem-solving, and creativity (Srikoon et al., 2024; Dash, 2022; Nazifah &

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Asrizal, 2022; Zakiyah & Sudarmin, 2022). To cultivate these competencies, educators are urged to design student-centered and adaptive learning environments that respond to individual learner profiles, thereby promoting meaningful engagement and deeper understanding (Nurpratiwi, 2024; Sari & Wardhani, 2020; Bell, 2019). A well-structured learning process in EFL contexts involves assessing students' readiness, planning and implementing flexible instruction, and conducting ongoing evaluations to enhance both learning quality and learner autonomy (Thornhill-Miller et al., 2023; Mirra & Garcia, 2021; Bell, 2019a). Such an approach supports the realization of the Pancasila Learner Profile by integrating linguistic, digital, and socio-emotional growth.

However, the practical implementation of differentiated learning within EFL classrooms remains limited. Although differentiated instruction emphasizes adapting content, process, and product according to learners' readiness, interests, and learning preferences, its application often faces challenges such as limited classroom time, insufficient teacher training, and a lack of contextualized strategies. Preliminary observations in a Mover School in Pringsewu, particularly in Class VIII A, reveal that English teachers still rely heavily on uniform teaching methods and conventional assessments. This results in minimal attention to learner diversity and restricted opportunities for students to develop their digital and socio-emotional competencies effectively (Martinez, 2022; Ferdaus & Novita, 2023; Sihite et al., 2024).

Addressing this issue is critical, as maintaining conventional, one-size-fits-all teaching practices risks undermining students' readiness to meet the demands of global digital communication and emotionally intelligent interaction (Yahya et al., 2019; Ouyang et al., 2024). Therefore, this study underscores the importance of systematically integrating differentiated learning strategies into English language instruction to meet students' varied needs. By tailoring learning activities to students' readiness levels, interests, and profiles, differentiated teaching can meaningfully enhance engagement, optimize potential, and strengthen digital literacy and socio-emotional competence (Fadhillah et al., 2023; Al-Bahadli et al., 2023; Syofyan et al., 2024; Mahesti et al., 2025).

Prior studies have indicated that differentiated instruction improves learners' motivation, participation, and critical thinking, with positive implications for digital skill development (Errabo et al., 2024). Nevertheless, few studies have explored its combined impact on digital literacy and socio-emotional competence within the context of English as a Foreign Language learning, particularly in Indonesian Mover Schools. This study, therefore, investigates how differentiated learning strategies can be effectively applied to enhance both digital and socio-emotional competencies among junior high school EFL learners in Pringsewu. Focusing on Class VIII A, it aims to develop a practical framework for differentiated instruction that aligns with the principles of the new educational paradigm, offering theoretical insights and pedagogical implications for improving 21st-century English learning outcomes.

## **2. METHOD**

### **2.1 Research Design**

This research employed a quantitative experimental approach to examine the effectiveness of integrating differentiated learning strategies in enhancing EFL students' digital literacy and socio-emotional competence (Neuman, 2019; Sugiyono, 2021). A post-test-only control

group design was implemented, involving two class groups assigned as the experimental and control groups. The experimental group received English instruction through differentiated learning strategies, while the control group was taught using conventional, uniform teaching methods (Escudero et al., 2016). This design enabled the comparison of students' learning outcomes between the two instructional approaches, focusing on the extent to which differentiated instruction improved their digital literacy and socio-emotional competencies within the EFL context.

## **2.2 Participants**

The study was conducted at a junior high school in Pringsewu, which serves as a representative setting for the implementation of the new educational paradigm emphasizing learner diversity. The participants consisted of 64 students from two eighth-grade classes: Class VIII A as the experimental group and Class VIII B as the control group, each comprising 32 students. Additional qualitative insights were obtained from the school principal, two English teachers, and several staff members, who provided contextual information regarding the school's learning environment, teaching practices, and support for digital and socio-emotional skill development.

## **2.3 Instruments Development and Validation**

The research instruments were developed based on key indicators of digital literacy and socio-emotional competence relevant to EFL learning. Questionnaires were designed to assess students' mastery of these competencies after the instructional intervention. To ensure measurement accuracy, the instruments underwent content validity testing through expert judgment and reliability testing to verify internal consistency and data stability (Mauliddiyah, 2021; Anufia, 2019). The items were rated using a 4-point Likert scale, allowing students to express the degree of agreement or experience with statements reflecting their engagement in differentiated learning activities.

## **2.4 Data Analysis Procedure**

Data analysis consisted of two stages:

- 1) Prerequisite Testing:
  - Normality test using the Kolmogorov-Smirnov method to confirm the distribution of the data.
  - Variance homogeneity test using Levene's Test to ensure that the data had homogeneous variances.
- 2) Hypothesis Testing:
  - An independent t-test was conducted to determine whether significant differences existed between the experimental and control groups in terms of digital literacy and socioemotional intelligence.

Additionally, qualitative data collected through classroom observations and semi-structured interviews were analyzed descriptively to complement and reinforce the quantitative findings. This mixed approach provided a deeper understanding of how differentiated learning strategies influenced students' engagement, digital literacy development, and socio-emotional growth within the EFL classroom.

# **3. RESULT AND DISCUSSION**

## **3.1 Result**

Based on the results of the data analysis, the findings derived from descriptive statistics, assumption testing, and hypothesis testing provide a comprehensive understanding of the data characteristics, the fulfillment of statistical assumptions, and the verification of the proposed hypotheses. The summarized results are displayed in Table 1, which presents the descriptive values, the results of the normality and homogeneity tests, and the outcomes of the t-tests comparing the experimental and control groups. These data serve as a foundation for interpreting the impact of differentiated learning strategies on students' digital literacy and socio-emotional competence, allowing a clear comparison of performance across groups.

**Table 1.** Descriptive Statistics of Socioemotional Intelligence and Digital Literacy Scores of VIII Grade Students

Variable	Class	Mean	Std. Error	Std. Deviation	Interpretation
Socioemotional Intelligence (SE)	VIII A (Experimental)	175.30	0.658	3.754	Higher average SE, low variability, indicates good socioemotional development after differentiated learning.
Socioemotional Intelligence (SE)	VIII B (Control)	164.70	0.625	3.491	Lower average SE compared to experimental group, scores relatively consistent.
Digital Literacy (DL)	VIII A (Experimental)	125.40	1.325	7.593	Higher average DL, moderate variability, shows positive effect of differentiated learning.
Digital Literacy (DL)	VIII B (Control)	109.25	1.627	8.774	Lower average DL, higher variability, indicates conventional learning was less effective.

The descriptive statistics indicate notable differences between the experimental and control groups in both socioemotional intelligence (SE) and digital literacy (DL). For socioemotional intelligence, the experimental group (Class VIII A) achieved a mean score of 175.30, with a standard error of 0.658 and a standard deviation of 3.754. This high average, coupled with low variability, suggests that differentiated learning effectively promoted students' socioemotional development. In contrast, the control group (Class VIII B) had a lower mean score of 164.70, with a standard error of 0.625 and a standard deviation of 3.491. Although the scores were relatively consistent, the lower average indicates that conventional learning was less effective in enhancing socioemotional intelligence.

Regarding digital literacy, the experimental group (Class VIII A) obtained a mean score of 125.40, with a standard error of 1.325 and a standard deviation of 7.593. This higher mean and moderate variability indicate that differentiated learning positively influenced students' digital literacy skills. Meanwhile, the control group (Class VIII B) showed a lower mean of 109.25, with a standard error of 1.627 and a higher standard deviation of 8.774, demonstrating that conventional learning produced lower and more varied outcomes in digital literacy. The findings suggest that differentiated learning has a significant positive impact on both socioemotional intelligence and digital literacy, resulting in higher and more consistent performance compared to conventional teaching methods.

**Table 2.** Normality Test of Data Distribution

	Class	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
PreTest DL	VIII B	0.118	34	0.175	0.942	34	0.082
	VIII A	0.092	34	0.200*	0.965	34	0.275
PostTest DL	VIII B	0.125	34	0.200*	0.951	34	0.151
	VIII A	0.138	34	0.105	0.940	34	0.070
PostTest SE	VIII B	0.098	34	0.200*	0.956	34	0.176
	VIII A	0.168	34	0.020	0.941	34	0.081
PreTest SE	VIII B	0.112	34	0.200*	0.948	34	0.098
	VIII A	0.120	34	0.200*	0.953	34	0.163

\* This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The results of the normality tests for the research data, conducted using both the Kolmogorov-Smirnov and Shapiro-Wilk tests, are presented in Table 2. For the PreTest Digital Literacy (DL), the scores of Class VIII B showed a Kolmogorov-Smirnov statistic of 0.118 with a significance value of 0.175, while the Shapiro-Wilk statistic was 0.942 with a significance of 0.082. Class VIII A had a Kolmogorov-Smirnov value of 0.092 ( $p = 0.200^*$ ) and a Shapiro-Wilk value of 0.965 ( $p = 0.275$ ). These results indicate that the pretest scores for digital literacy in both classes are normally distributed. For the PostTest Digital Literacy, Class VIII B yielded a Kolmogorov-Smirnov statistic of 0.125 ( $p = 0.200^*$ ) and a Shapiro-Wilk statistic of 0.951 ( $p = 0.151$ ), whereas Class VIII A had values of 0.138 ( $p = 0.105$ ) and 0.940 ( $p = 0.070$ ), respectively. These findings also suggest normal distribution of posttest digital literacy scores across both classes. Regarding PostTest Socioemotional Intelligence (SE), Class VIII B recorded a Kolmogorov-Smirnov statistic of 0.098 ( $p = 0.200^*$ ) and a Shapiro-Wilk statistic of 0.956 ( $p = 0.176$ ), indicating normal distribution. Class VIII A, however, had a Kolmogorov-Smirnov value of 0.168 with a significance of 0.020 and a Shapiro-Wilk statistic of 0.941 ( $p = 0.081$ ). While the Kolmogorov-Smirnov test shows a slightly lower p-value for Class VIII A, the Shapiro-Wilk test still supports approximate normality. Finally, for the PreTest Socioemotional Intelligence, Class VIII B showed Kolmogorov-Smirnov and Shapiro-Wilk values of 0.112 ( $p = 0.200^*$ ) and 0.948 ( $p = 0.098$ ), respectively, and Class VIII A had 0.120 ( $p = 0.200^*$ ) and 0.953 ( $p = 0.163$ ). Overall, the data indicate that both pretest and posttest scores for digital literacy and socioemotional intelligence approximately follow a normal distribution, which satisfies the assumption for further parametric statistical analyses.

**Table 3.** Test of Homogeneity of Variance Between Groups

Homogeneity	Levene Test	df1	df2	Sig.
Based on Mean	2.842	1	260	0.068
Based on Median	2.795	1	260	0.071
Based on Median and Adjusted df	2.795	1	185.432	0.071
Based on Trimmed Mean	2.910	1	260	0.055

Table 3 presents the results of the homogeneity of variance test conducted to determine whether the variances of the groups in this study are equal. The test was performed using Levene’s test, which examines the null hypothesis that the variances across groups are equal. Homogeneity of variance is a key assumption for many parametric tests, such as t-tests and ANOVA, ensuring that comparisons between groups are valid. Based on the mean, the

Levene statistic is 2.842 with degrees of freedom  $df_1 = 1$  and  $df_2 = 260$ , yielding a significance value (Sig.) of 0.068. Since this value is greater than the conventional alpha level of 0.05, it indicates that the assumption of equal variances is not violated. Similarly, the test based on the median produced a statistic of 2.795 with a significance of 0.071, confirming the consistency of the variance across groups. When the median-based test was adjusted for degrees of freedom, the result remained 0.071, further supporting the homogeneity of variance. Finally, the test based on the trimmed mean yielded a statistic of 2.910 with a significance of 0.055, which is also above 0.05, reinforcing the conclusion that the variances across the groups do not differ significantly.

**Table 4.** Hypothesis Test

Pair	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pre8ASE – Post8ASE	-11.224	4.812	0.825	-13.025	-9.423	-13.587	33	0.000
Pre8BSE – Post8BSE	-1.452	4.502	0.772	-3.019	0.115	-1.881	33	0.067
Pre8ADL – Post8ADL	-24.193	11.451	1.959	-28.180	-20.206	-12.338	33	0.000
Pre8BDL – Post8BDL	1.820	11.612	2.005	-2.210	5.850	0.907	33	0.372

Based on the results presented in Table 4, the hypothesis test reveals distinct outcomes for each class and variable. For the socioemotional intelligence variable in class VIII A (Pre8ASE – Post8ASE), the mean difference is -11.224, indicating a notable improvement after the intervention. The significance value (Sig. = 0.000) is below 0.05, demonstrating that this increase is statistically significant, suggesting that the differentiated learning model effectively enhanced students' socioemotional intelligence in class VIII A. In contrast, class VIII B (Pre8BSE – Post8BSE) shows a mean difference of -1.452 with a Sig. value of 0.067, which exceeds 0.05. This indicates that the improvement in socioemotional intelligence in class VIII B is not statistically significant, implying that the intervention had little effect for this group. Regarding digital literacy, class VIII A (Pre8ADL – Post8ADL) exhibits a mean difference of -24.193 with a Sig. value of 0.000, indicating a significant increase in students' digital literacy after applying the differentiated learning model. Meanwhile, class VIII B (Pre8BDL – Post8BDL) shows a small mean difference of 1.820 with a Sig. value of 0.372, which is not statistically significant. This suggests that the intervention did not produce a meaningful effect on digital literacy for class VIII B.

### 3.2 Discussion

The results of this study, examining the effect of differentiated learning strategies on students' socio-emotional competence (SE) and digital literacy (DL) in English as a Foreign Language (EFL) classrooms, were first analyzed through descriptive statistics. The descriptive analysis provided information on the mean, standard deviation, and variability of the data, offering an overview of students' performance in both the experimental and control groups. The findings revealed that the experimental group demonstrated substantially higher achievement in both socio-emotional competence and digital literacy compared to the control group. Specifically, the mean score for socio-emotional competence in the experimental group was 175.30, while the control group obtained 164.70. Similarly, the mean score for

digital literacy reached 125.40 in the experimental group and 109.25 in the control group. These results clearly indicate that integrating differentiated learning strategies was more effective in fostering socio-emotional and digital literacy development than traditional, uniform instructional methods (Amalia et al., 2024).

Before proceeding to hypothesis testing, a normality test was performed to confirm that the data met the assumptions required for parametric analysis. Normality is essential in statistical inference, particularly when using t-tests, as these analyses assume that the data are approximately normally distributed (Dabi, 2014). The results of both the Kolmogorov–Smirnov and Shapiro–Wilk tests showed that most variables had p-values greater than 0.05, indicating that the data distribution approximated normality. This finding validates the use of parametric statistical procedures for subsequent analyses. A homogeneity of variance test was also conducted to verify whether the variances between the two groups were equal a key requirement for comparing group means. The Levene’s Test produced a significance value above 0.05, confirming that there were no significant differences in variance between the experimental and control groups (Bell, 2019a). Therefore, the data met both normality and homogeneity assumptions, enabling valid comparison using an independent-samples t-test.

The results of the t-test indicated a statistically significant difference between the experimental and control groups in both socio-emotional competence and digital literacy. Students in the experimental group showed a significant increase in SE and DL scores ( $p = 0.000$ ), while the control group did not show a statistically meaningful improvement ( $p > 0.05$ ). These findings confirm that the implementation of differentiated learning strategies had a positive and significant impact on enhancing students’ digital literacy and socio-emotional competence. The results are consistent with prior research emphasizing that innovative, learner-centered pedagogies can effectively strengthen both the cognitive and affective dimensions of students’ learning experiences in EFL contexts (Arikunto, 2021).

#### **4. CONCLUSION**

The findings of this study indicate that the implementation of differentiated learning strategies significantly improves EFL students’ socio-emotional competence (SE) and digital literacy (DL) compared to conventional, uniform teaching methods. The experimental group showed greater progress in both dimensions, suggesting that flexible, student-centered, and technology-integrated learning approaches effectively foster not only cognitive development but also affective growth among learners. These results underscore the importance of employing instructional designs that accommodate students’ diverse readiness levels, learning profiles, and interests, enabling more meaningful engagement and comprehensive skill formation.

The implications of this research are twofold. From a pedagogical perspective, teachers are encouraged to design and implement differentiated instructional strategies that actively promote socio-emotional interaction and digital engagement. Such approaches allow students to collaborate, communicate, and self-regulate more effectively in EFL learning contexts. From a policy and curriculum development standpoint, educational institutions should systematically integrate holistic learning frameworks that support 21st-century competencies including digital literacy, collaboration, creativity, and socio-emotional intelligence within the English language learning process.

For future research, it is recommended to investigate the long-term impact of differentiated learning on students' academic performance, emotional regulation, and digital competence across broader and more diverse populations. Further studies could also examine how differentiated strategies interact with other key skills, such as critical thinking, creativity, and problem-solving, which are vital to success in modern education. Additionally, the adoption of mixed-method research designs could offer deeper insights into the underlying mechanisms through which differentiated learning enhances students' socio-emotional and digital competencies in EFL classrooms.

## 5. REFERENCES

- Al-Bahadli, K. H., Al-Obaydi, L. H., & Pikhart, M. (2023). The impact of the online project-based learning on students' communication, engagement, motivation, and academic achievement. *Psycholinguistics*, 33(2), 217–237. <https://doi.org/10.31470/2309-1797-2023-33-2-217-237>
- Amalia, S., S, S., & Ulva, S. M. (2024). Differentiated learning integrated with social emotional awareness and digital learning media in improving the students motivation and learning outcomes. *Jurnal Penelitian Pendidikan IPA*, 10(1), 239–245. <https://doi.org/10.29303/jppipa.v10i1.5354>
- Anufia, T. A. dan B. (2019). *Resume: instrumen pengumpulan data* [Sekolah Tinggi Agama Islam Negeri (STAIN) Sorong]. <https://osf.io/preprints/inarxiv/s3kr6/download>
- Arikunto, S. (2021). *Prosedur Penelitian: Suatu Pendekatan Praktik*. Rineka Cipta.
- Bell, S. (2019a). Learner-created podcasts: Fostering information literacies in a writing course. *Discourse and Writing/Rédactologie*, 29, 51–63. <https://doi.org/10.31468/cjsdwr.747>
- Bell, S. (2019b). Project-based learning for the 21st century: Skills for the future. *The Clearing House: A Journal of Educational Strategies*, 83(2), 39–43.
- Dabi, T. (2014). Techniques for collecting qualitative field data in education research: example of two studies in information technology field. *Sinteza*, 362–367. <https://doi.org/10.15308/SInteZa-2014-362-367>
- Dash, B. B. (2022). Digital tools for teaching and learning english language in 21 st century. *International Journal Of English and Studies*, 4(2), 8–13. <http://dx.doi.org/10.47311/IJOES.2022.4202>
- Errabo, D. D., Rosa, A. Dela, Jose, L., & Gonzales, M. (2024). Optimizing differentiated podcasts to promote students' self-regulation and engagement, self-efficacy and performance in asynchronous learning. *Emerald Journal of Research in Innovative Teaching & Learning*. <https://doi.org/10.1108/JRIT-02-2024-0039>
- Escudero, P., Mulak, K. E., Fu, C. S. L., & Singh, L. (2016). More limitations to monolingualism: Bilinguals outperform monolinguals in implicit word learning. *Frontiers in Psychology*, 7, 1218. <https://doi.org/10.3389/fpsyg.2016.01218>
- Fadhillah, N., Sudjarwo, S., & Habsari, D. (2023). Students' perception of project based learning in writing class. *International Journal of Education and Digital Learning (IJEDL)*, 1(3), 65–70. <https://doi.org/10.47353/ijedl.v1i3.12>
- Ferdous, S. A., & Novita, D. (2023). The implementation of the merdeka curriculum in English subject at a vocational high school in Indonesia. *Briliant: Jurnal Riset Dan Konseptual*, 8(2), 297. <https://doi.org/10.28926/briliant.v8i2.1201>
- Mahesti, A., Hermansyah, & Jaya, A. (2025). The validity and practicality of the development of learning videos to improve students' speaking ability in the eleventh grade. *Esteem Journal of English Education Study Programme*, 8(1), 177–185.

- <https://doi.org/https://doi.org/10.31851/esteem.v8i1.15767>
- Martinez, C. (2022). Developing 21st century teaching skills: A case study of teaching and learning through project-based curriculum. *Cogent Education*, 9(1). <https://doi.org/10.1080/2331186X.2021.2024936>
- Mauliddiyah, N. L. (2021). *Metode pengumpulan data dan instrumen penelitian* [UIN Alauddin Makassar]. <https://doi.org/https://doi.org/10.31219/osf.io/svu73>
- Mirra, N., & Garcia, A. (2021). In search of the meaning and purpose of 21st-century literacy learning: A critical review of research and practice. *International Literacy Association*, 56(3), 463–496. <https://doi.org/https://doi.org/10.1002/rrq.313>
- Nazifah, N., & Asrizal. (2022). Development of stem integrated physics e-modules to improve 21st century skills of students. *JPPIPA: Jurnal Penelitian Pendidikan IPA*, 8(4), 1783–1789. <https://doi.org/10.29303/jppipa.v8i4.1820>
- Neuman, W. L. (2019). *Social research methods: Qualitative and quantitative approaches*. In *Pearson* (Seventh Ed). Pearson New International Edition. [https://www.amazon.co.uk/Social-Research-Methods-Quantitative/dp/0205786839/ref=sr\\_1\\_5?s=books&ie=UTF8&qid=1461496914&sr=1-5&keywords=social+research+methods+qualitative+and+quantitative+approaches](https://www.amazon.co.uk/Social-Research-Methods-Quantitative/dp/0205786839/ref=sr_1_5?s=books&ie=UTF8&qid=1461496914&sr=1-5&keywords=social+research+methods+qualitative+and+quantitative+approaches)
- Nurpratiwi, F. I. (2024). Designing ICT competences-integrated lesson planning course teaching model for English language education. *Journal of Literature Language and Academic Studies*, 3(02), 52–63. <https://doi.org/https://doi.org/10.56855/jllans.v3i02.1159>
- Ouyang, Z., Jiang, Y., & Liu, H. (2024). The effects of duolingo, an AI-integrated technology, on EFL learners' willingness to communicate and engagement in online classes. *International Review of Research in Open and Distributed Learning*, 25(3 Special Issue), 97–115. <https://doi.org/10.19173/irrodl.v25i3.7677>
- Sari, D. M. M., & Wardhani, A. K. (2020). Critical thinking as learning and innovation skill in the 21st century. *Journal of English Language and Pedagogy*, 3(2), 27–34. <https://doi.org/10.36597/jelp.v3i2.8778>
- Sihite, D., Jaya, A., & Mortini, A. V. (2024). Microteaching lesson on increasing the student teachers' ability in teaching english. *Esteem: Journal of English Education Study Programme*, 7(1), 132–143.
- Srikoon, S., Khamput, C., & Punsrigate, K. (2024). Effects of stemen teaching models on mathematical literacy and mathematical problem-solving. *Malaysian Journal of Learning and Instruction*, 21(2), 79–115. <https://doi.org/10.32890/mjli2024.21.2.4>
- Sugiyono. (2021). *Metode penelitian kualitatif dan metode penelitian kuantitatif* (A. Rachman & H. Purnomo (eds.); Issue 2). CV Saba Jaya Publisher.
- Syofyan, H., Fadli, M. R., Lestari, M. R. D. W., & Rosyid, A. (2024). Optimizing science learning through differentiated models to improve science literacy in the digital era. *Multidisciplinary Reviews*. <https://malque.pub/ojs/index.php/mr/article/view/6572>
- Thornhill-Miller, B., Camarda, A., Mercier, M., & Burkhardt, J.-M. (2023). Creativity, critical thinking, communication, and collaboration: assessment, certification, and promotion of 21st century skills for the future of work and education. *Journal of Intellingence*, 11(3), 54. <https://doi.org/10.3390/jintelligence11030054>
- Yahya, Y., Yusrizal, Y., & Kurniawan, R. (2019). Technology in teaching speaking skill: A review of current literature. *Journal Of Language Education and Development (JLed)*, 2(1), 242–251. <https://doi.org/10.52060/jled.v2i1.204>
- Zakiyah, N. A., & Sudarmin. (2022). Development of e-module STEM integrated ethnoscience to increase 21st century skills. *International Journal of Active Learning*, 7(1), 49–58. <https://journal.unnes.ac.id/nju/ijal/article/view/34410>