Jurnal Pembangunan dan Pendidikan: Fondasi dan Aplikasi
Volume x, No. x, xxxx

Online: http://journal.uny.ac.id/index.php/jppfa

Improving Student Learning Outcomes Through Collaboration of the Student Teams Achievement Division (STAD) and Jigsaw Learning Models

ARTICLE INFO

Article History
Received:
-
Revised:
-
Accepted:
-
Available online:
-

Keywords
Collaboration; Jigsaw Learning Model; Student Learning Outcomes; Student Teams Achievement Division (STAD) Learning Model

ABSTRACT

The problem in this study is the low student learning outcomes. This study aims to determine the increase in student learning outcomes using the collaborative learning model Student Teams Achievement Division (STAD) and Jigsaw in the Correspondence subject at SMK Negeri 1 Medan in the 2022/2023 academic year. This research uses using experimental method. This study's population was all class X AP students at SMK Negeri 1 Medan, totaling 144 people consisting of 4 classes. The sample in this study consisted of 2 courses, Class X AP-1 (Experimental), totaling 36 people, and X AP-2 (Control), totaling 36 people. The research instrument used to collect data was an objective test in the form of multiple choice, which destroyed 20 questions that had tested for validity with four answer choices. The data analysis showed that the experimental class's average value was 79.3, with a standard deviation of 8.38. At the same time, the average value of the Control class is 73.9, with a standard deviation of 7.94. Hypothesis testing was carried out using the t-test with dk = n1 + n2 – 2 at a significant level of 95%. From the calculation of the hypothesis obtained a tcount of 3.008 and ttable 1.6684. The results of hypothesis testing show that t count > t table (3.008 > 1.6684), then the hypothesis is accepted. From the results of this study, it can be concluded that there was an increase in student learning outcomes using the collaborative learning model Student Teams Achievement Division (STAD) and Jigsaw by 39.47% in the Class X AP Correspondence subject at SMK Negeri 1 Medan in the 2022/2023 academic year.

INTRODUCTION

Education is an important aspect of human life and a component that is used as a benchmark for the progress of a nation (Bartanen et al., 2021; Mathews, 2021). If a nation's level of education is high, who can say that the country is already advanced, but if the education level of a government is still low, then the nation still needs to be progressive. Education is essential because, with human education, it will be easier to develop and be developed. Therefore, educational issues need to receive better attention and handling regarding various topics related to quality and relevance (Li & Xue, 2022).

When viewed from a narrow point of view, education tends to lead to schools, where schools are a place that is built to shape the character of children and provide material that has previously been designed and organized, and scheduled with supervision, which will then be evaluated concerning the goals to be achieved. To achieve learning success, it is necessary to have a learning design that determines the learning process's results. If a lesson is not designed in a systematic and directed manner, of course, the learning process will not run well. This is because the learning process is no longer directed and tends to be conditional, which results in learning targets not being achieved (Sadowska & Laffy, 2019).

In order to realize the systematic learning process, it is necessary to have an RPP (Learning Implementation Plan) that functions as a planning medium in the learning process (Lee & Griffin,

2021). This RPP contains steps and the entire learning process that takes place systematically. The problem of learning design is related to lesson plans and the learning model used by the teacher in the learning process. This follows the author's experience during the PPLT at the Budisatrya Private Vocational School in Medan. The average teacher uses conventional learning models and methods with non-supportive learning media. This is because traditional learning methods and models are commonly used. This also happened at SMK Negeri 1 Medan. Although some teachers have made variations by applying a series of learning models, some teachers still apply conventional learning models.

Based on observations made by researchers shows that correspondence subject teachers at SMK Negeri 1 Medan have started using the learning model. It's just that the teacher only sometimes uses the learning model. Some of the teachers still use and apply conventional learning methods. Correspondence is one of the vocational subjects in Office Administration. This subject contains the delivery of theory and practice. When delivering an approach, teachers tend to apply conventional methods.

Meanwhile, students more often do individual assignments with their friends when practicing. Delivery of material using conventional methods tends to make students feel bored and results in students spending time telling stories with their friends. This impacts these students who need help understanding the material presented by the teacher. So that when the practice takes place, the procedure is no longer conducive. Students who do not understand will try to ask the teacher and friends who are considered to have understood (Virkkula, 2022). Even though the teacher has guided students during practice and fellow students help each other during the learning process, there are better solutions than this. Students considered to have understood will feel bored and disturbed by the questions of students who do not understand.

The results of observations made by the author at SMK Negeri 1 Medan show that student learning outcomes are relatively low. This can be seen from the effects of student learning in the correspondence subject of class X AP, most of which are below the Completeness score (KKM). Based on the data, it can be seen that 18 students, or 12.5% of the total students, namely 144, still need to achieve the Minimum Completeness Criteria (KKM) that can have set at school, namely 70. The low student learning outcomes above were due to a need for more student activity in learning interactions with both the teacher and fellow students. The lack of student activity can be seen when teachers finish delivering the material and give assignments as practice. Many students don't want to think about completing their projects independently. They wait and copy their friend's work. Then if the teacher asks a question, only a few students can answer, and even though some answer is limited to certain students, many students are less willing to ask if there are difficulties in learning.

This research employs a constructivist learning theory methodology. According to Feng et al. (2022) Constructivists contend that knowledge is not gained passively but rather by active dialogue, active inquiry, and the production of meaning with the assistance of settings produced by others and based on prior knowledge and experience. Learning is a process in which learners continually expand and modify their current knowledge and experience through the interaction of new experience with their previous knowledge and experience. Constructivists emphasize the context-dependent character of knowledge, learning, and wisdom. Specifically, knowledge resides in specific, situational, and perceptual processes, and conceptual knowledge is not an abstract, situation-independent thing, but can only be grasped through real application (Pande & Bharathi, 2020; Suwannaphisit et al., 2021).

Based on the problems that occur, the purpose of this study is to find out the increase in student learning outcomes through the collaboration of the Student Teams Achievement Division (STAD) and Jigsaw learning models in Class X AP Correspondence Subjects at SMK Negeri 1 Medan in the 2022/2023 Academic Year. As for some previous research that is relevant to this research, namely research conducted by Sa'adiah et al. (2021) that there is a significant influence between the STAD type cooperative learning model in terms of numerical ability on mathematics learning outcomes, but for the Jigsaw learning model there is no effect of the learning model in terms of numerical ability on mathematics learning outcomes and there is no difference between classes using the STAD model and classes using the JIGSAW model in terms of numerical abilities on students' mathematics learning outcomes. In line with this, research conducted by Rohmat et al.

(2019) explained that the results of the research on the application of the Jigsaw cooperative learning model were able to improve learning outcomes in economics subjects in each cycle.

RESEARCH METHOD

This quantitative research approach tests specific theories by examining the relationship between variables or treatment or intervention research results controlled by other factors (Creswell, 2014). The research method used is the experimental method, namely data from an existing environment without direct intervention by the researcher, with the whole group of subjects (entire group). This study involved one experimental class and one control class. From the selected category, the experimental class was given correspondence learning with the collaboration of the Student Teams Achievement Division (STAD) and jigsaw learning models. In contrast, the control class was offered a conventional learning model. For obtain accurate data in this study, data collection techniques were carried out by means of observation, documentation and tests. Based from research Endo et al., (2018) the sampling technique used is proportional technique sampling, The population in this study was class X Office Administration consisting of 4 classes, namely X AP 1, X AP 2, X AP 3, and X AP 4, with a total of 144 students.

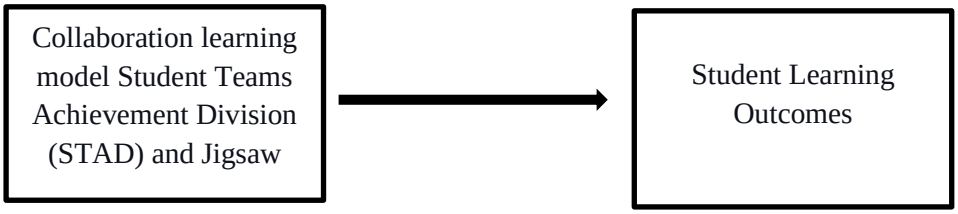

Figure 1. Research Design

Validity is an assessment instrument used to measure and indicate a mechanism's level of validity or validity (Kılıç et al., 2021). A device is valid if it can quickly measure and reveal data from the variables studied. By using the product moment correlation formula with criteria if $r_{count} > r_{table}$ at a significant level of 95% or $\alpha = 0.05$ then the instrument is declared valid, then if r_{count}.

An instrument is stated to have a high level of confidence if the instrument can provide consistent results. In this case, a reliability test was carried out using the Kuder Richardson formula (K-R20) (Partin et al., 2022). Distinguishing power is a group of test items on learning outcomes that indicate students who have high and low abilities (Sakthivel et al., 2020). The questionnaire that shows the magnitude of the difference in the articles is called the discrimination index, abbreviated as D. The difficulty level is the student's ability to do the test correctly (Y. Liu & Zheng, 2022). The difficulty index is denoted by P to determine the difficulty index for each item used in this study.

In this study, the processed data is the result of learning from class to analyzing the data by Shi et al., (2014) using the following data normality test, data homogeneity test, and hypothesis testing. Data normality test aims to see whether the sample is normally distributed or not (Jobst et al., 2022; Psaradakis & Vávra, 2020; Xiao & Hau, 2022) with criteria If $L_{count} < L_{table}$ means the data is normally distributed or vice versa. If $L_{count} > L_{table}$, the data is not normally distributed. Data homogeneity test use For find out whether the data from the experimental class and control class are homogeneous or not (Flores et al., 2018; Sun et al., 2022), a homogeneity test is carried out at a significant level of 5% with criteria F calculated consulted with the frequency distribution table F ($\alpha = 0.05$). If F_{table} then the two sample groups come from homogeneous populations. Hypothesis testing use to test the hypothesis whether the truth can be accepted or rejected (Jankowski et al., 2018; C. Liu & Jurich, 2023; West, 2021) with criteria the significance level used in this test is ($\alpha = 0.05$) with the test criteria. The hypothesis is accepted if $t_{count} > t_{table}$ means there is a significant effect. The hypothesis is rejected if $t_{count} < t_{table}$ means there is no significant effect.

RESULT AND DISCUSSION

3.1 Description of Research Results

This research was conducted at SMK Negeri 1 Medan, located at Jl. Sindoro No.1, Ps. Center, Medan Kota, Medan City, North Sumatra, and when this research was conducted in the even semester of the 2022/2023 Academic Year from April to May 2020 with a population of 144 students and a sample of 72 students. They were taken by random sampling technique, namely two classes consisting of X AP 1 and X AP 2, each with 36 students. The two classes will be given different treatments. Namely, type X AP 1 as the experimental class using the collaborative learning model Student Teams Achievement Development (STAD) with Jigsaw and class X AP 2 as the control class using the conventional learning model.

The technique used to measure student learning outcomes is by using a test in the form of multiple choice, which totals 20 questions. The test in this study was a standardized test taken from the appropriate learning textbook. Before this, research was started by carrying out a pre-test for each experimental and control class which aimed to determine the student's initial abilities to be given different treatments for each category and then given a post-test. Based on the data analysis that has been done, the following research results are obtained.

3.2 Research Instrument Test

Before carrying out the research, a research instrument test is first carried out to measure what will be studied. The researcher made a test of 20 multiple choice test questions with four alternative answers. Based on the research results for the test instruments, all were declared valid and fulfilled the reliable criteria. The difficulty level of the questions is five questions belonging to the easy category, ten medium questions, and five difficult questions. For different power, the questions are pretty good and enough.

3.3 Data analysis

Table 1. Pre-Test and Post-Test Average Obtained Results

Class	Data Type					
	Pres-Test			Post-Test		
	$\bar{X}$	S	S^2	$\bar{X}$	S	S^2
Experiment	48	5,9	34,81	79,3	8,38	70,2
Control	44,9	10,7	114,49	73,9	7,94	63,04

The research results found that the average pre-test for the experimental class was 48, the average pre-test for the control class was 44.9, the average post-test for the experimental class was 79.3, and for the control, the course was 73.9.

Next, the data normality test for each research variable will be carried out using the Liliefors technique, namely, giving the data distribution based on the normal distribution. The normality test is an absolute requirement for further tests to test the research hypothesis. The pre-test and post-test data are typically distributed based on the calculation results.

The next step, the data normality test for each research variable will be carried out using the Liliefors technique, namely, giving the data distribution based on the normal distribution. The normality test is an absolute requirement for further tests to test the research hypothesis. The pre-test and post-test data are normally distributed based on the calculation results.

Table 2. Post-Test Normality Test for Experimental Class

Xi	Fi	Fkum	Zi	Fzi	Szi	|Fzi-Szi|
65	2	2	-1,70718	0,043894	0,055556	0,011661
70	8	10	-1,1105	0,133393	0,277778	0,144385

75	6	16	-0,51381	0,303692	0,444444	0,140753
80	6	22	0,082873	0,533024	0,611111	0,078087
85	6	28	0,679558	0,751608	0,777778	0,02617
90	7	35	1,276243	0,899065	0,972222	0,073157
95	1	36	1,872927	0,969461	1	0,030539
					L_{hitung}	0,1443
					L_{tabel}	0,1477
					Infor	Normal

From the data above, the absolute value of |Fzi-Szi| is obtained the largest (L_{count}) = 0.1443 and from the Liliefors test list with a significant level of 95% and n = 36 obtained L_{table} = 0.1477. So the results obtained are $L_{count} < L_{table}$ (0.1443 <0.1477), so it can be concluded that the pre-test data of experimental class students is normally distributed.

Table 3. Post-Test Normality Test for Control Class

Xi	**Fi**	**Fkum**	**Zi**	**Fzi**	**Szi**	**|Fzi-Szi|**
60	3	3	-1,74962	0,040092	0,083333	0,043241
65	5	8	-1,11975	0,131409	0,222222	0,090813
70	8	16	-0,48989	0,312105	0,444444	0,132339
75	7	23	0,139969	0,555658	0,638889	0,083231
80	9	32	0,769831	0,7793	0,888889	0,109589
85	2	34	1,399692	0,919197	0,944444	0,025247
90	2	36	2,029554	0,978799	1	0,021201
					L_{count}	0,1323
					L_{tabel}	0,1477
					Notes	Normal

From the data above, the absolute value of |Fzi-Szi| is obtained as the largest (L_{count}) = 0.1323, and from the Liliefors test list with a significant level of 95% and n = 36 obtained L_{table} = 0.1477. So the results obtained are $L_{count} < L_{table}$ (0.1323 <0.1477), so it can be concluded that the pre-test data of experimental class students is normally distributed. Then a homogeneity test is carried out to see whether the two data from different samples are homogeneous.

Table 4. Results of Tilapia Homogeneity Test Pre-Test and Post-Test

Data	**Class**	**Varians**	**F_{count}**	**F_{table} 95% (α = 0,05)**	**Informatiom**
Pre-test	Experiment	5,9	1,813	1,89	Homogen
	Control	10,7			
Post-test	Experiment	8,38	1,055	1,89	Homogen
	Control	7,94			

S^2 = Varians Sampel; F_{tabel} = dk (n-1) (α = 0,05)

From the data above, the Fcount for the pre-test is 1.813, and the Fcount for the post-test is 1.055. Then the value is consulted with the value of the F distribution table at a significance level of 95% with the dk in the numerator = 36 between the dk in the numerator 30 and 40 and the dk in the denominator = 36 between the dk in the denominator 34 and 36, so F_{table} = 1.89. $F_{count} < F_{table}$ means that the data from both samples for the pre-test and post-test are homogeneous, or the samples come from the same variance.

The last step in analyzing the research data is to test the hypothesis, which refers to concluding whether to accept or reject the hypothesis. We can conduct hypothesis testing on the post-test scores of the two sample groups by performing a t-test to prove the research hypothesis. The results of the calculation of the student post-test data, obtained the following values:

$\bar{X}_1$ = (*Experiment*) =	79,3	S_1^2 (*Experiment*) = 70,2	n_1 = 36
$\bar{X}_2$ = (*Control*) =	73,9	S_2^2 (*Control*) = 63,01	n_2 = 36

Which:

$$S^2 = \frac{(n_1-n)\,S_1^2+(n_2-1)\,S_2^2}{n_1+n_2-2}$$
$$S^2 = \frac{(36-1)\,70{,}2+(36-1)\,63{,}01}{36+36-2}$$
$$S^2 = \frac{(35)\,70{,}2+(35)\,63{,}01}{70}$$
$$S^2 = 66{,}605$$
$$S = \sqrt{66{,}605}$$
$$S = 8{,}16$$

and:

$$t_{count} = \frac{\overline{x_1-x_2}}{s\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$$
$$t_{count} = \frac{79{,}3-73{,}9}{8{,}16\sqrt{\frac{1}{36}+\frac{1}{36}}}$$
$$t_{count} = \frac{5{,}4}{8{,}16\sqrt{0{,}05}}$$
$$t_{count} = \frac{5{,}4}{8{,}16\,(0{,}22)}$$
$$t_{count} = \frac{5{,}4}{1{,}795}$$
$$t_{count} = 3{,}008$$

Then the hypothesis's value is compared by comparing the value of the t-distribution table at the 95% confidence level at α = 0.05. The value of $t_{(0.95)(70)}$ is not found in the t distribution, so dk = 36+36-2 = 70 is between dk = 60 and dk = 120, then ttable is calculated by linear interpolation, namely:

- For $t_{(0,95)(70)}$ = x
- For dk = 60 and α = 0,05 get $t_{(0,95)}$ = 1,67
- For dk = 120 and α = 0,05 get $t_{(0,95)}$ = 1,66

and:

$$t_{(0,95)(70)} = 1{,}67 + \frac{70-60}{120-60}\,(1{,}66 - 1{,}67)$$
$$t_{(0,95)(70)} = 1{,}67 + \frac{10}{60}\,(-0{,}01)$$
$$t_{(0,95)(70)} = 1{,}67 - 0{,}0016$$
$$t_{(0,95)(70)} = 1{,}6684$$

By comparing t_{count} and t_{table}, it is found that $t_{count} > t_{table}$ (3.008 > 1.6684). Thus it can be concluded that the hypothesis is accepted, namely that there is an increase in student learning outcomes through the collaboration of the Student Teams Achievement Devicion (STAD) learning model with Jigsaw in the correspondence subject of class X AP at SMK Negeri 1 Medan in the 2022/2023 academic year.

3.4 Discussion of Research Results

The research at SMK Negeri 1 Medan involved two classes providing different learning models. Class X AP-1, as the experimental class, was treated with the collaborative learning model

Student Teams Achievement Development (STAD) with Jigsaw. Class X AP-2, the control class, was treated with conventional learning models.Before the two classes were given different learning treatments, the two classes were first given a pre-test to determine students' initial learning abilities in each category. After that, a post-test was given to assess student learning outcomes after being given different treatments in the two sample groups.

The test in class X consisted of 20 questions in the form of multiple choice with four answer choices. The results of the validity test obtained as many as 20 questions which were all valid. So that the 20 items of this question were used as a research instrument in data collection. The research results showed that the average pre-test score of the experimental class students was 48, with the highest score being 60 and the lowest score being 35, and the standard deviation of 5.9. While the average pre-test score of the control class students was 44.9, with the highest score of 65, the lowest score of 30, and a standard deviation was 10.7.

From giving the pre-test to the two classes, namely the experimental and control classes, no one got a score above 70. After being treated in these two classes, the scores obtained by the students began to increase, as seen from the post-test data from each category, namely the experimental and control classes. The experimental class was given treatment by applying the collaborative learning model of Student Teams Achievement Division (STAD) with Jigsaw. The average score obtained by students in the experimental class was 79.3, while in the control class, which was treated by applying conventional learning models, the average value of the control class was 73.9.

Based on the normality test pre-test experimental class obtained L_{count} = 0.1446. At a significant level of 95% and n = 36, L_{table} = 0.1477 is obtained. It means that $L_{count} < L_{table}$, namely 0.1446 <0.1477 so it can be concluded that the population is normally distributed. The control class pre-test normality test obtained L_{count} = 0.1193. At a significant level of 95% and n = 36, L_{table} = 0.1477 is obtained. It means that $L_{count} < L_{table}$, namely 0.1193 <0.1477, so it can be concluded that the population is normally distributed. Then the post-test normality test in the experimental class obtained L_{count} = 0.1443. At a significant level of 95% and n = 36, L_{table} = 0.1477 means that $L_{count} < L_{table}$, namely 0.1443 <0.1477, so it can be concluded that the population is normally distributed. Post-test normality test in the control class obtained L_{count} = 0.1323. At a significant level of 95% and n = 36, L_{table} = 0.1477 means that $L_{count} < L_{table}$, namely 0.1323 <0.1477, so it can be concluded that the population is normally distributed.

So from the results of the homogeneity test calculation for the pre-test value, F_{count} is 1.813, and F_{table} is 1.86 at a significant level of 95%. To obtain $F_{count} < F_{table}$, namely 1.813 <1.86. Then the homogeneity test for the post-test value received Fcount of 1.055 Ftable of 1.86 at a significant level of 95%. To obtain $F_{count} < F_{table}$, namely 1.055 <1.86. So the data from the two samples for pre-test and post-test scores have the same variance or are homogeneous.

Based on the hypothesis, testing is done by comparing the value of the t-distribution table at the 95% confidence level at $\alpha = 0.05$. The value of $t_{(0,95)(70)}$ is not found in the t distribution, so dk = 36+36 – 2 = 70 is between dk = 60 and dk = 120, so ttable is calculated by linear interpolation. By comparing tcount and ttable, it is found that $t_{count} > t_{table}$, namely (3.008 > 1.6684). Thus it can be concluded that the hypothesis is accepted, namely that there is an increase in student learning outcomes through the collaboration of the Student Teams Achievement Division (STAD) learning model with Jigsaw in the correspondence subject of class X AP at SMK Negeri 1 Medan in the 2022/2023 academic year. This can also be seen from the percentage increase in student learning outcomes. Learning outcomes using the collaborative learning model Student Teams Achievement Division (STAD) with Jigsaw was 39.47% in class X AP at SMK Negeri 1 Medan in the 2022/2023 academic year. Thus the hypothesis is accepted.

This research follows the theory that there is an increase in student learning outcomes using the collaborative learning model of Student Teams Achievement Division (STAD) with Jigsaw. The results of this study also support research conducted by Elpisah & Bin-Tahir (2019), O'Leary et al. (2019), Rahimi et al. (2020), and Yuliani (2019) that there is an increase in student learning achievement using the Student Teams Achievement Devision (STAD) learning model and with Jigsaw.

This study has several limitations, including the number of experimental classes, which only involve two courses, the experimental and control classes. The number of schools as research objects

is limited to one school and only one major. Future researchers should focus more on more things and other subjects and examine other variables related to learning outcomes, such as students' thinking skills, learning styles and motivation.

CONCLUSION

Based on the results of the research that has been done, it can be concluded: Student learning outcomes after applying the collaborative learning model Student Teams Achievement Division (STAD) with Jigsaw in correspondence subjects are higher than student learning outcomes using conventional learning models. This can be seen from the average student learning outcomes with the collaborative learning model Student Teams Achievement Division (STAD) with Jigsaw of 79.3 and for conventional learning models of 73.9. Based on the hypothesis, testing is done by comparing the value of the t-distribution table at the 95% confidence level at $\alpha = 0.05$. The value of t(0,95)(70) is not found in the t distribution, so dk = 36+36 – 2 = 70 is between dk = 60 and dk = 120, so t_{table} is calculated by linear interpolation. By comparing tcount and ttable, it is found that $t_{count} > t_{table}$ (3.008 > 1.6684). Thus it can be concluded that there is an increase in student learning outcomes through the collaboration of the Student Teams Achievement Division (STAD) learning model with Jigsaw in the correspondence subject for class X AP at SMK Negeri 1 Medan in the 2022/2023 academic year.

REFERENCES

Bartanen, B., Rogers, L. K., & Woo, D. S. (2021). Assistant Principal Mobility and Its Relationship With Principal Turnover. *Educational Researcher*, *50*(6), 368–380. https://doi.org/10.3102/0013189X21993105

Creswell, J. W. (2014). *A concise introduction to mixed methods research*. SAGE publications. https://www.ptonline.com/articles/how-to-get-better-mfi-results

Elpisah, E., & Bin-Tahir, S. Z. (2019). Student team achievement division (Stad) model in increasing economic learning outcomes. *International Journal of Scientific and Technology Research*, *8*(10), 3089–3092.

Endo, T., Chiba, G., van Rooijen, W. F. G., Yamanaka, M., & Pyeon, C. H. (2018). Experimental analysis and uncertainty quantification using random sampling technique for ADS experiments at KUCA. *Journal of Nuclear Science and Technology*, *55*(4), 450–459. https://doi.org/10.1080/00223131.2017.1403387

Feng, Z., Chu, C., Zhu, D., Ji, N., Cui, J., & Huang, Z. (2022). Investigation of intervention methods based on different leading roles in family regarding child road safety education: An experimental study. *Accident Analysis & Prevention*, *178*, 106874. https://doi.org/10.1016/j.aap.2022.106874

Flores, R., Lillo, R., & Romo, J. (2018). Homogeneity test for functional data. *Journal of Applied Statistics*, *45*(5), 868–883. https://doi.org/10.1080/02664763.2017.1319470

Jankowski, K. R. B., Flannelly, K. J., & Flannelly, L. T. (2018). The t -test: An Influential Inferential Tool in Chaplaincy and Other Healthcare Research. *Journal of Health Care Chaplaincy*, *24*(1), 30–39. https://doi.org/10.1080/08854726.2017.1335050

Jobst, L. J., Auerswald, M., & Moshagen, M. (2022). The Effect of Latent and Error Non-Normality on Measures of Fit in Structural Equation Modeling. *Educational and Psychological Measurement*, *82*(5), 911–937. https://doi.org/10.1177/00131644211046201

Kılıç, S., Tan, M. N., & Mevsim, V. (2021). Validity and reliability of Turkish version of the craving experience questionnaire in the assessment of cigarette smoking. *Journal of Substance Use*, *26*(5), 475–482. https://doi.org/10.1080/14659891.2020.1851403

Lee, A., & Griffin, C. C. (2021). Exploring online learning modules for teaching universal design

for learning (UDL): preservice teachers' lesson plan development and implementation. *Journal of Education for Teaching*, *47*(3), 411–425. https://doi.org/10.1080/02607476.2021.1884494

Li, J., & Xue, E. (2022). Meta-conceptualizing the high-quality education system: Insight from China. *Educational Philosophy and Theory*, 1–9. https://doi.org/10.1080/00131857.2022.2118577

Liu, C., & Jurich, D. (2023). Outlier Detection Using t-test in Rasch IRT Equating under NEAT Design. *Applied Psychological Measurement*, *47*(1), 34–47. https://doi.org/10.1177/01466216221124045

Liu, Y., & Zheng, B. (2022). Comparability of difficulty levels of translation tasks in CET-6 parallel test forms: evidence from product and process-based data. *The Interpreter and Translator Trainer*, *16*(4), 428–447. https://doi.org/10.1080/1750399X.2022.2036938

Mathews, H. M. (2021). Developing a Theory of Program Vision as Professional Socialization in Special Education Teacher Preparation. *Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children*, 088840642110589. https://doi.org/10.1177/08884064211058901

O'Leary, N., Barber, A., & Keane, H. (2019). Physical education undergraduate students' perceptions of their learning using the jigsaw learning method. *European Physical Education Review*, *25*(3), 713–730. https://doi.org/10.1177/1356336X18767302

Pande, M., & Bharathi, S. V. (2020). Theoretical foundations of design thinking – A constructivism learning approach to design thinking. *Thinking Skills and Creativity*, *36*, 100637. https://doi.org/10.1016/j.tsc.2020.100637

Partin, R. D., Meldrum, R. C., Lehmann, P. S., Back, S., & Trucco, E. M. (2022). Low Self-Control and Cybercrime Victimization: An Examination of Indirect Effects Through Risky Online Behavior. *Crime & Delinquency*, *68*(13–14), 2476–2502. https://doi.org/10.1177/00111287211061728

Psaradakis, Z., & Vávra, M. (2020). Normality tests for dependent data: large-sample and bootstrap approaches. *Communications in Statistics - Simulation and Computation*, *49*(2), 283–304. https://doi.org/10.1080/03610918.2018.1485941

Rahimi, S., Ahmadian, M., Amerian, M., & Dowlatabadi, H. R. (2020). Comparing Accuracy and Durability Effects of Jigsaw Versus Input Flood Tasks on the Recognition of Regular Past Tense /-ed/. *SAGE Open*, *10*(2), 215824402091950. https://doi.org/10.1177/2158244020919505

Rohmat, Hakim, L., & Canda Sakti, N. (2019). Implementation of Jigsaw Type Cooperative Learning Model to Improve Economics Learning Results. *International Journal of Educational Research Review*, 350–357. https://doi.org/10.24331/ijere.573871

Sa'adiah, H., Syaiful, S., Hariyadi, B., & Yudistira, P. (2021). Student team achievement divisions (STAD) and jigsaw learning in terms of numerical abilities: The effect on students' mathematics learning outcomes. *Desimal: Jurnal Matematika*, *4*(3), 247–260. https://doi.org/10.24042/djm.v4i3.9746

Sadowska, N., & Laffy, D. (2019). Measuring the impact of strategic design learning experience long after the classroom delivery. *The Design Journal*, *22*(sup1), 1305–1315. https://doi.org/10.1080/14606925.2019.1594957

Sakthivel, V. P., Suman, M., & Sathya, P. D. (2020). Squirrel search algorithm for economic dispatch with valve-point effects and multiple fuels. *Energy Sources, Part B: Economics, Planning, and Policy*, *15*(6), 351–382. https://doi.org/10.1080/15567249.2020.1803451

Shi, W., You, Y., Shao, P., & Wan, Y. (2014). Standard deviation of line objects in geographic information science. *Annals of GIS*, *20*(1), 39–51.

https://doi.org/10.1080/19475683.2013.862297

Sun, S., Li, Z., & Jiang, H. (2022). Homogeneity test and sample size of risk difference for stratified unilateral and bilateral data. *Communications in Statistics - Simulation and Computation*, 1–24. https://doi.org/10.1080/03610918.2022.2142240

Suwannaphisit, S., Anusitviwat, C., Hongnaparak, T., & Bvonpanttarananon, J. (2021). Expectations on online orthopedic course using constructivism theory: A cross-sectional study among medical students. *Annals of Medicine and Surgery*, *67*, 102493. https://doi.org/10.1016/j.amsu.2021.102493

Virkkula, E. (2022). Student teachers' views of competence goals in vocational teacher education. *European Journal of Teacher Education*, *45*(2), 250–265. https://doi.org/10.1080/02619768.2020.1806229

West, R. M. (2021). Best practice in statistics: Use the Welch t -test when testing the difference between two groups. *Annals of Clinical Biochemistry: International Journal of Laboratory Medicine*, *58*(4), 267–269. https://doi.org/10.1177/0004563221992088

Xiao, L., & Hau, K.-T. (2022). Performance of Coefficient Alpha and Its Alternatives: Effects of Different Types of Non-Normality. *Educational and Psychological Measurement*, 001316442210882. https://doi.org/10.1177/00131644221088240

Yuliani, N. (2019). The Role of Student Teams Achievement Divisions (STAD) in Improving Student's Learning Outcomes. *Classroom Action Research Journal*, *3*(1), 8–15. https://doi.org/10.17977/um013v3i12019p008