The Effect of Learning Model and Interest on Statistics Learning Outcomes

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Abstract. The goal of this study is to determine the effect of learning models, STAD and explicit teaching, on the students' statistic learning outcomes. The study was conducted in the Indonesian Language and Literature Study Program at the Faculty of Teacher Training and Education at the University of Muhammadiyah Mataram. This study is quantitative in nature, employing a quasi-experiment method and a 2 × 2 factorial by level design. The research sample consisted of all students enrolled in a statistics course, and 54 students were chosen at random as the samples. The following methods were used to collect data: 1) questionnaires, 2) multiple-choice tests to find out students' mathematical-logic intelligence, and 3) essay to test students statistics learning outcomes. After controlling mathematical-logical intelligence, the findings are as follows: 1) STAD was more effective than explicit teaching; 2) learning models used and interest affected the learning result; 3) for the low-interest category group, STAD was more effective than explicit teaching; and 4) there was insufficient evidence to support the statement that for the high-interest category group, explicit teaching model was more effective than STAD model.

Keywords: STAD · Explicit Teaching · Mathematical-Logical Intelligence · Statistics

1 Introduction

A statistics course is a subject taught in almost all study programs at universities. Statistics is essential because: 1) Students must conduct research at the end of their study and mastering statistics will help them process their data. 2) Learning is a lifelong process and human is often faced with number on a daily basis. 3) Statistics helps students interpret empirical data logically and systematically. Statistics is a subject often considered "difficult" by students.

One indicator is that when students are asked about statistics courses, the most common response is "it is a difficult course." Low-test results, both formative and summative, is another indicator. Table 1 contains data that can be used to analyze students score in statistics. According to the data, more than half of the students received a D on the middle semester exam, or 53%, or 71 students out of a total of 135 students. When this number is combined with students who receive a C, it equals 99 students, or 74%. The

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Table 1. The percentage of students Midterm and Final Exam Scores in PBSI Study Program, FKIP UMM

Results	Frequency of Midterm Exam	%	Frequency of Final Exam	%
A	14	10%	36	27%
B	22	16%	33	24%
C	28	21%	27	20%
D	71	53%	39	29%
Sum	135	100	135	100

Statistics course, which has three course credits, requires a minimum grade of B to pass. The majority of students will be declared unsuccessful if the passing grade is solely based on midterm exam scores.

These student accomplishments can be influenced by a variety of factors, including lecturers, students, interaction in the learning process, and use of media and learning resources. The choice of learning models will have a significant impact on the outcomes since it determines the interaction between lecturers and students in class. Students' motivation, interest, and initial ability are factors that also play a role in their performance. If the learning outcomes do not match the target, the learning models chosen must be reconsidered in light of the characteristics of students who are the focus of the learning. An expository approach is commonly used in statistics lectures. This method is also referred to as direct or deductive instruction [1–3]. Expository learning is also known as chalk and talk strategy [2, 3], interactive teaching, active teaching, explicit teaching [4, 5], and whole-class teaching [6]. The direct teaching-learning model is a traditional model that has been used since the teaching-learning concept was introduced. Prior to the establishment of formal schools, learning activities consisted of interactions between teachers and students in which the teacher served as a source of new information and knowledge and the students were tasked with listening to and understanding what the teacher said. Despite its age, this model is still widely used in the learning process, and extensive research has demonstrated its effectiveness [2, 3]. The explicit teaching model can be effective if it is implemented as follows: 1) clear teaching, daily reviews, homework, 2) presentation of new materials and skills, 3) exercises under the supervision of the teacher, 4) corrective feedback and instructional reinforcement, 5) free practice in class and at home, and 6) weekly and monthly evaluations [2]. Because there is no perfect model, the explicit teaching model has both advantages and disadvantages [1]. The five steps or stages of implementing the Explicit Teaching model are orientation, presentation, structured exercises, guided exercises, and independent exercises [1, 6].

The cooperative learning group [3, 7] includes the STAD (Student Team-Achievement Division) learning model, which is the simplest [3]. Cooperative learning is heavily influenced by holistic cognitive learning psychology, which emphasizes the importance of thinking in learning [1]. It is also based on a humanistic and behavioral approach [3], because what is developed is not only students' cognitive abilities, but also students' positions as holistic subjects who receive full personality reinforcement with intrapersonal development [1, 2] through dynamic interactions in the classroom [2]. Its characteristics can be seen in [1, 2], and [8]. According to Slavin, the STAD learning model by Cruickshank, Jenkins, and Metcalf [3] is the simplest, best-known, and most frequently used form, and it is a good model to begin with for teachers who are new to cooperative approaches. There are various perspectives on the stages of STAD learning [10–12] and the stages used in this study are 1) orientation, 2) teacher presentation, 3) learning in teams/groups, 4) quizzes, and 5) awards for team achievements. In determining how students learn and forecasting learning outcomes, interest is a more intrinsic and fundamental factor [13–15]. When a German psychologist named Herbart wrote that interest can increase motivation and learning, Dewey stated that interest is a form of individual and environmental interaction, Thorndike stated in 1935 that interest is a factor that influences learning, and Bartlett discovered the role of interest in the formation of memory functions [16]. Until now, interest has remained an issue that is always intriguing to investigate. To understand interest, three general perspectives can be used: 1) interest as a personal interest, 2) contextual interest, and 3) psychological interest [16–18]. According to the three perspectives, interest can be defined as a mental condition with both affective and cognitive components. According to Child [19], there are four types of interest: expressed, manifested, measured, and finally inventoried interest.

Experts disagree on whether interest arises as a result of learning or as a trigger that influences learning outcomes. Bloom [20], Brubacher [14], and Murphy and Davidshofer [21] are more likely to be interested as a result of their learning process. Renninger is more likely to regard interest as a trigger [16]. Renninger implies that interest and knowledge are two distinct psychological substances, but they are inextricably linked. Renninger's viewpoint can be applied in the first of the three general perspectives of the previously mentioned interests (personal interest). It should also be noted that interests differ from abilities, despite sharing some of the same patterns [21]. The research interests are personal in nature, with dimensions such as tendencies, general preferences, pleasure, the significance of the object of interest [17], and initial abilities [21]. When compared to simply asking about a person's interests [22], using an inventory to measure self-interest is more effective [21]. The inventory technique is expected to improve the expression of one's interest. Gardner's multiple intelligences include mathematical-logical intelligence, which is defined as the ability to use numbers effectively or to think and make good decisions [23, 24]. This concept of mathematical-logical intelligence can be contrasted with several theoretical bases on intelligence, such as the Stanford-Binet IQ test. [25, 26], Cattel's crystallized intelligence [26], Spearman's g-factor [26–28], Thurstone's 7 primary mental abilities [25, 26, 28], Sternberg's triarchic theory [26], analytic intelligence in Sternberg's triarchic theory [26]. Inventory is one of the tools that can be used in the measurement. Methodologically, the inventory is more concerned with the state of a person's personality than with their abilities. Armstrong's multiple intelligence inventory is more focused on mapping a person's potential intelligence or on a person's interest in a specific field [24]. Because intelligence is defined as a skill, measuring mathematical-logical intelligence will be more precise if the test method is used, which consists of three parts: an ability test relating to the ability to solve simple arithmetic problems, a series of numbers/letters/number patterns, and an ability test to think logically. These three components are elements implied by the term mathematical-logical intelligence. By controlling mathematical-logical intelligence, Abadi [29] investigated the effect of authentic assessment and cooperative learning models on statistics learning outcomes. Widiana [30] investigated the effect of learning models and forms of assessment on the learning outcomes of inferential statistics by controlling numerical abilities using a slightly different set of variables. After controlling for numerical aptitude, Seteman [31] attempts to explain the diversity of student learning outcomes in computer programming based on the type of assessment, mathematical-logical intelligence. Ghazi et al. [32], Pour et al. [33], and Rifa'i [34] conducted research that included mathematical-logical intelligence, multiple intelligences, or intelligence as an explanatory variable, among others, and intrinsic motivation as the second independent variable. Maulana [35] conducted research involving interest in learning, among other things, with learning methods as a treatment variable and learning outcomes in mathematics as the dependent variable. According to the findings of the literature review, there haven't been many studies comparing cooperative learning and direct teaching, with interest as an attribute, on statistics learning outcomes after controlling for mathematical-logical intelligence. In general, the goal of this research is to provide an alternative to the scarcity of studies on related topics. In general, this study aims to determine the influence of learning methods (STAD and Explicit Teaching) and interest in student learning outcomes in Statistics courses by controlling mathematical-logical intelligence.

2 Methods

The learning model treatment factors, learning interest attributes, mathematical-logical intelligence covariates, and the dependent variable on statistics learning outcomes are all part of this experimental study. The factorial 2×2 treatment by level with covariates design was used. The study was carried out at the Indonesian Language and Literature Study Program, FKIP UMM, with 56 students taking part. Participants were divided into two groups based on treatment, each of which had 28 students. An inventory was used to measure interest variables, which were then used to divide participants into low-interest and high-interest groups. A multiple-choice test comprised of quantitative abilities and logical thinking was used to assess mathematical-logical intelligence. A descriptive test with three questions is used to assess statistics learning outcomes. The treatment variables, which are included in the lecture plan and consist of six face-to-face meetings, are carried out with care, with an emphasis on minimizing threats to the internal and external validity of the research design. Before being used in data collection, all instruments must first be tested for validity and reliability. After providing an overview of the data with descriptive statistics, answers to research questions are based on the results of covariate analysis. Covariate analysis was performed after the following assumptions were met: normality, variance homogeneity, linearity of correlation between covariate and dependent variable, independence of covariate from treatment effect, regression slope homogeneity, and reliability of covariate measurement (Table 2).

Table 2. Design of Treatment by Level 2 × 2 Experiment with Covariate

Interest (B)	Learning Method (A)	
	STAD (A1)	Explicit Teaching (A2)
Lower Interest (B1)	[X,Y}11k k =1, 2, …, n11	[X,Y}21k k = 1, 2, …, n21
Higher Interest (B2)	[X,Y}12k k = 1, 2, …, n12	[X,Y}22k k = 1, 2, …, n22

3 Results

The descriptive analysis results show that the average learning outcomes of the STAD groups are 6.04 with a standard deviation of 1.50, while the group taught by Explicit Teaching is 3.96 with a standard deviation of 1.02. The average learning outcome of STAD-taught groups with low interest is 5.20, with a standard deviation of 1.32. The low-interest group received an average statistics learning outcome of 3.73 and a standard deviation of 0.86 when taught using the Explicit Teaching model. The average learning outcome of the group taught with STAD in the high-interest category was 6.89, with a standard deviation of 1.18. The group that received Explicit Teaching received an average of 4.59 and a standard deviation of 1.37. The following are the results of hypothesis testing with covariate analysis: 1. H0: A1 A2 is the first hypothesis to be tested, with the alternative hypothesis Ha: A1 > A2. The null hypothesis is used as the decision criterion, and it is rejected if the F-count value is greater than the F-table. The analysis yields an F-count value of 99.08 for the learning model and an F-table value of 4.03 with an alpha of 0.05. Based on these findings, the decision is made to reject H0 and accept H1. The conclusion that can be drawn is that students who study using STAD have higher average learning outcomes than those who study using Explicit Teaching. 2. The second hypothesis under consideration is the interaction of the learning and interest models. The null hypothesis is expressed as the interaction $A \times B = 0$; the alternative hypothesis is expressed as the interaction $A \times B = 0$. The analysis yielded an F-count value of 4.878 and an F-table value of 4.03 at an alpha of 0.05. Because the obtained F-count is greater than the F-table value, the decision is made to reject H0 and accept Ha. Based on the findings, it is possible to conclude that the interaction of the learning model (A) and interest (B) influences student learning outcomes in the Statistics course. The magnitude of the difference in the F-count value obtained is relatively small when compared to the F-table value at alpha 0.05, which is 4.878 versus 4.03. This minor difference will have an effect on the intersection of the invisible interaction lines, as shown in Fig. 1.

Because of the interaction effect, the test can be extended to two simple effect hypotheses, namely the differences in learning outcomes of special statistics in the low and high interest categories, as shown below. 3. H0: A1B1. The third hypothesis tested is A2B1, with Ha: A1B1 > A2B1. The t-test results show a t-count of 5.488, a t-table of 0.05, and an alpha of 1.706. The decision is made to reject the null hypothesis and accept the alternative hypothesis because the t-count obtained is greater than the t-table value.

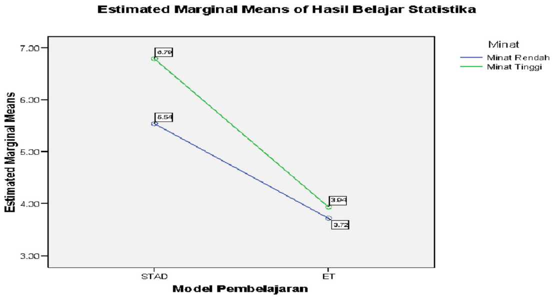

Fig. 1. Interaction between Learning Models and Interests in Statistics Learning Outcomes after Controlling Mathematical-Logical Intelligence

Based on these findings, it is possible to conclude that, after controlling for mathematical-logical intelligence, the average statistics learning outcomes of students taught by the STAD model are greater than the average statistics learning outcomes of students taught by the STAD model. Explicit instruction 4. The final null hypothesis tested in this study is A1B2 A2B2. The t-test yields a t-value of 8.686 and a t-table of -1.706 at an alpha of 0.05. Because the obtained t-count is greater than the t-table, the decision is made to accept H0 and reject H1. Based on this decision, it can be stated that, after taking into account the mathematical-logical intelligence of the students, there is insufficient evidence to conclude that the STAD learning model provides better learning outcomes than the Explicit Teaching-learning model.

4 Discussion

The following is a discussion of the problem formulation based on the results of hypothesis testing. 1. Differences in student learning outcomes in the Statistics course between the STAD learning model and Explicit Teaching when students' Mathematical-Logical Intelligence is taken into account According to the findings of the study, the STAD model is more effective than the Explicit Teaching model. The Explicit Teaching model is a traditional learning model with a one-way communication pattern, namely from lecturers to students, and a teacher-centered learning approach [1, 2]. Lecturers are expected or conditioned to be individuals who not only understand the lecture material but can also effectively communicate it to students. Failure to communicate lecture material will result in students having a poor understanding of the material. When we look at the elements that make the explicit teaching model effective, we can see that it is relatively difficult to do in a lecture, particularly in statistics lectures. Statistics that are relatively broad will be difficult to convey in a limited amount of time. Although there is a theory that explicit teaching can achieve optimal learning objectives on standard materials, this will be difficult to implement in statistics lectures. Individuals who have a negative perception of the material will mechanically show resistance to it. Less positive interests may have consequences for a lack of early abilities.

Statistics is the study of numbers, formulas, and calculations. Most people's reactions to numbers, formulas, and calculations will be positive. When statistics material is delivered in an ineffective manner, it is difficult to achieve optimal learning objectives. Another factor that can be used to justify the study's findings is the culture of Indonesian society, which is not conducive to learning. A psychological barrier has been constructed, consciously or unconsciously, between the teacher's room and the student area. This psychological barrier can be so thick that communication that should be dialogical becomes a monologue. Students tend to accept passively because they are shy, embarrassed, and/or concerned about making mistakes, or because the teacher is so limited in stimulating students to bring out their best abilities. The STAD method, on the other hand, is based on the philosophical tenet that humans are social beings who live collectively to meet their needs. The cooperative strategy includes the STAD method. The teacher who is the source of learning in this method is not only the teacher who stands in front of the class and gives the initial material; there are also other teachers whose role it is to strengthen and clarify the material that the real teacher has taught. Peer-teaching and cooperative learning, in addition to increasing the number of teachers in the classroom, can help to reduce the psychological barrier that exists between the teacher and the students. Learning conditions become more fluid, and with the flexibility that is built, learning objectives will be more optimally achieved.

2. The interaction of learning models and interest in learning on student learning outcomes in the Statistics course, taking Mathematical-Logical Intelligence into account. The analysis results show that there are differences in statistics learning outcomes across the four groups based on interest category and learning model. The proportion of diversity that can be explained by the interest variable alone is 15.8%, indicating that interest has a significant influence in the model consisting of the learning model variables (A), interest (B), AB interaction, and Mathematical-Logical Intelligence (C). The learning model has the highest proportion of diversity in this model, at 66%. While the interaction of learning models and interests can explain the variation in student statistics by 8.7%, learning outcomes by 8.7%.

Learning outcomes are a multifaceted ability that is inherent in and defines a person. In statistics learning, the learning outcomes that are most likely to be measured after the learning process is completed place a greater emphasis on cognitive capacity, which is a compound substance influenced by a variety of factors. The teacher's learning strategies, as well as students' interests and initial potential, are three factors that will influence student achievement in learning. The right strategy, combined with the students' initial abilities and interests, will be able to condition students to achieve better results. The Statistics course includes materials for teaching about numbers, formulas, and logical reasoning. When it comes to numbers and formulas, not all students are interested in the same things. This curiosity can be interpreted as a psychological condition that exists or manifests itself long before they are confronted with the current situation. Someone's interest in something can be linked to their talent or initial potential. Meanwhile, someone with lower mathematical-logical intelligence will be less interested in calculations and the use of formulas.

The learning model can be interpreted as social engineering, which conditions students to be able to achieve goals effectively under certain conditions. The lecturer is at the center of learning in the explicit teaching model, and students are positioned as passive parties who accept every piece of material presented. According to the cooperative learning philosophy, team or group work mechanisms can better accommodate students' diverse backgrounds, initial abilities, and interests. Students who have advantages are trained to teach other members of their group. In the STAD learning model, there is more than one teacher in the classroom who stands and sits in front of the class and has the same duties and responsibilities as the actual teacher. Two important factors that can explain student achievement in learning are interests and learning models. Low interest in a course, if not accompanied by the appropriate strategy, will have implications for the attitude of resistance to the material being studied in all of its forms. Similarly, when interest is high but the strategies used are not properly implemented, the high interest becomes a hidden potential that cannot be used as a momentum to maximize learning outcomes.

3. Differences in student learning outcomes in statistics courses taught using the STAD model versus specific explicit teaching in the low-interest group. The findings of this study can be used to argue that when a person's interest is low, the STAD model is the most effective learning model to use. One of the factors that can motivate someone to do something is self-interest. When a person's interest is low and there is no other stimulus, the effort he expends to achieve the goal will be inefficient. Because the lecturer is the primary source of knowledge in expository learning or explicit teaching, relatively few stimuli are presented. When there is unclear and ununderstood material, students are less motivated to ask questions because of low interest and psychological barriers between lecturers and students, resulting in a lack of knowledge, understanding, and mastery of the lecture material.

Different outcomes are expected from cooperative learning or the STAD model. Each group member plays the same role in encouraging and motivating one another. Furthermore, when questions arise, each member can ask the chosen group leader directly because he has advantages in understanding and mastering the material being studied. If the group leader is unable to provide an optimal answer, he may request additional explanation from the lecturer, which he will then relay to his fellow group members. When individuals work together to achieve group goals, the learning process is more effective than when each individual works alone when their interest in the material being studied is relatively low.

Differences in student learning outcomes in statistics courses taught using the STAD model versus specific explicit instruction in the high-interest category. The research findings show that there is insufficient evidence to conclude that statistics learning outcomes are lower when taught using the STAD model than when taught using the Explicit Teaching model, particularly for students with high-interest categories. After the initial materials are delivered, there is interest in this research. After receiving the initial material, respondents have a clearer picture of the statistics, allowing them to gauge their interest in the next material to be studied. Even if they lack well-developed mathematical-logical intelligence, some students have a relatively high interest in statistics courses. He will put forth the same effort to understand the teaching material as other students with greater mathematical-logical intelligence.

However, the final result appears to be different due to the differences in their initial starting points. When using the explicit teaching model, each student is more reliant on themselves to understand the material. Individual goals are used as group goals in STAD learning, and they will compensate for each other's shortcomings to achieve these goals. Collaboration in STAD learning will be able to compensate for the shortcomings of students with lower mathematical-logical intelligence. While in Explicit Teaching, the student's mathematical-logical abilities will be limited because he will have no friends to help him when he encounters problems. When compared to dealing directly with lecturers, the peer-teaching method will make student learning more effective. When students complement each other, there are no psychological barriers between lecturers and students. As a result, the learning process and complement among group members can be more directed toward achieving a common goal than if each student had to learn alone, relying on their initial abilities. Group members in the STAD learning model come from a variety of backgrounds, particularly in terms of academic potential and/or mathematical-logical intelligence. Group members with high academic potential will be assigned to tutor other members of the group who are deficient. Members who do not understand the lecture material can ask questions directly to the lecturer and other members of the group. With this principle of togetherness, it appears that the learning outcomes will be more optimal than if each student had to study individually.

5 Conclusions

The following conclusions can be drawn based on the research findings and the results of hypothesis testing: 1. After accounting for students' mathematical-logical intelligence, student learning outcomes in statistics courses using the STAD learning model are higher than those in courses using the Direct Teaching model. 2. After taking into account students' mathematical-logical intelligence, the interaction of learning models and interest in learning influences student learning outcomes in the Statistics course. 3. After accounting for students' mathematical-logical intelligence, student learning outcomes in statistics courses using the STAD model are higher than those in courses using the Direct Teaching model, particularly in the low-interest category. 4. After taking into account students' mathematical-logical intelligence, student learning outcomes in statistics courses using the STAD model are higher than those using the Direct Teaching model, especially for students with a high interest in learning.

References

1. Sanjaya, W. (2006). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Kencana Prenada Media.
2. Lang, H. R., & Evans, D. N. (2006). *Models, strategies, and methods for effective teaching*. Perason Education Inc.
3. Cruickshank, D. R., Jenkins, D. B., & Metcalf, K. K. (2006). *The act of teaching* (4th ed.). The McGraw Hill Companies.
4. Dell'Olio, J. M., & Donk, T. (2007). Models of teaching: Connecting student learning with standards. Sage Publications.
5. Muijs, D., & Reynolds, D. (2008). *Effective Teaching: Teori dan Aplikasi (terjemahan Helly Prajitno & Sri Mulyantini Sutjipto)*. Sage Publications.
6. Joyce, B., Weil, M., & Calhoun, E. (2009). *Models of teaching* (8th ed.). Pearson Education Inc.
7. Slavin, R. E. (2009). *Cooperative learning: Teori, riset, dan praktik*. Nusa Media.

8. Arends, R. I. (2008). *Learning to Teach – Belajar untuk Mengajar, Edisi Ketujuh, Buku Kedua, terjemahan Helly Prajitno Soetjipto dan Sri Mulyantini Soetjipto*. Pustaka Pelajar.
9. Slavin, R. E. (1995). *Cooperative learning, theory, research, and practice teaching* (2nd ed.). Allyn and Bacon.
10. Slavin, R. E., & Learning, C. (2010). *Theory, research, and practice*. Allyn and Bacon.
11. Jacobsen, D. A., Eggen, P., & Kauchak, D. (2009). *Methods for teaching*. Pustaka Pelajar.
12. Rusman. (2010). *Model-model Pembelajaran – Mengembangkan Profesionalisme Guru*. RajaGrafindo Persada.
13. Djaali, H. (2008). *Psikologi Pendidikan*. Bumi Aksara.
14. Brubacher, J. S. (1950). *Modern phylosophies of education*. McGraw-Hill Book Company Inc.
15. Nunnally, J. C. (1986). *Educational measurement and evaluation*. McGraw-Hill.
16. Schunk, D. H., Pintrich, P. R., Meece, J. L. (2008). *Motivation in education: Theory, research, and applications*. Pearson Merill Prentice Hall.
17. Woolfolk, A. (2009). *Educational Psychology Active Learning Edition, Bagian Pertama, diterjemahkan oleh Helly Prajitno Soetjipto dan Sri Mulyantini Soetjipto, Cetakan Pertama*. Pustaka Pelajar.
18. Schiefele, U. (Spring 1991). *Interest, learning, and motivation* (Vol. 26, no. 2). Educational Psychologist. ISSN 0046-1520.
19. Child, D. (1991). *Psychology and the teacher*. Cassel Education Ltd.
20. Bloom, B. S. (1979). *Taxonomy of educational objectives book 1 cognitive domain*. Longman Group Ltd. (Ed. Benjamin S. Bloom).
21. Murphy, K. R., Davidshofer, C. O. (1991). *Psychological testing: Principles and applications*. Prentice-Hall Inc.
22. Aiken, L. R. (1994). *Psychological testing and assessment*. Allyn and Bacon.
23. Gardner, H. (1983). *Frames of mind the theory of multiple intelligences* (Tenth Anniversary Edition). Basic Books.
24. Armstrong, T. (2009). *Multiple intelligences in the classroom* (3rd ed.). ASCD.
25. Nevid, J. S. (2012). *Essentials of psychology concepts and applications* (3rd ed.). Cengage Learning.
26. Pastorino, E., & Doyle-Portillo, S. (2013). *What is psychology? Essentials* (2nd ed.). Cengage Learning.
27. Carlson, N. R. (1990). *Psychology: The science of behavior* (3rd ed.). Allyn and Bacon.
28. Lahey, B. B. (2012). *Psychology an introduction*. The Mcgraw-Hill Companies Inc.
29. Abadi, I. B. G. S. (2016). Pengaruh Asesmen Otentik dan Model Pembelajaran Kooperatif terhadap Hasil Belajar Statistik dengan Mengontrol Kecerdasan Logis Matematis (Eskperimen pada Mahasiswa PGSD UPP Denpasar Undiksha). Disertasi, PEP PPS UNJ.
30. Widiana, I W. (2016). Pengaruh Model Pembelajaran dan Bentuk Asesmen terhadap Hasil Belajar Statistik Inferensial dengan Mengontrol Kemampuan Numerik Siswa (Eskperimen pada Jurusan PG PAUD Undiksha Bali). Disertasi, PEP PPs UNJ.
31. Setemen, K. (2014). Pengaruh Jenis Asesmen dan Kecerdasan Logis-Matematis terhadap Hasil Belajar Pemrograman Komputer dengan Mengontrol Bakat Numerik. Disertasi PEP PPs UNJ.
32. Ghazi, S. R., Shahzada, G., Gilani, U. S., Shabbir, M. N., & Rashid, M. (2011). Relationship between students' self perceived multiple intelligences and their academic achievement. *International Journal of Academic Research, 3*(2), 621 (diakses pada 28 Maret 2014).
33. Pour-Mohammadi, M., Abidin, M. J. Z., & Ahmad, K. A. B. Y. (2012). The relationship between students' strength in multiple intelligences and their achievement in learning English language. *Journal of Language Teaching and Research, 3*(4), 677–686. (diakses pada 2 April 2014).

34. Rifa'i, A., & Belajar, H. (2005). Statistika: Studi Korelasional antara Inteligensi dan Motivasi Intrinsik dengan Hasil Belajar Statistika. Disertasi, PEP PPs UNJ.
35. Maulana, J. (2007). Pengaruh Metode Pembelajaran dan Minat Belajar terhadap Hasil Belajar Matematika Siswa Madrasah Aliyah Negeri 8 Jakarta. Disertasi, PEP PPs UNJ.