

[Research Article]

INVESTIGATION THE LEVEL OF STUDENT LEARNING STRATEGIES IN PHYSICS COURSES THROUGH THE LASSI INSTRUMENT

Ilham Akbar

Department of Mathematics Education, Faculty of Teaching and Education Sciences, Universitas Tompotika Luwuk, Banggai, Indonesia
E-mail: ilhambaga@gmail.com

DOI: <http://dx.doi.org/10.15575/jotalp.v8i1.22978>

Received: 30 January 2023; Accepted: 7 February 2023; Published: 28 February 2023

ABSTRACT

Learning strategy is a strategy students need to gain academic achievement effectively and efficiently. Students with a high level of learning strategies (> 75%) have greater potential for academic success, as in this study which aims to analyze the level of student learning strategies in physics courses through the LASSI instrument. The LASSI instrument is used to diagnose the level of learning strategies, including skill, will, and self-regulated. Each of the three components has essential subscales, including anxiety, attitude, motivation, concentration, information processing, time management, test strategy, self-testing, study aids, and selection of main ideas. Miles and Huberman's technique is used as a technique in data analysis. The respondents included in this study were 65 students, consisting of 38 second-semester students of the mathematics education study program, 17 students of the fourth semester, and ten extension students of the sixth semester. The implications of the results of this study reveal that: 1. student learning outcomes in physics courses based on gender have levels, where females have a higher level of learning strategies than males on the anxiety scale (ANX), Reasoning / Information processing (INP), Concentration (CON), and Using Academic Resources (UAR). While males are superior on the attitude subscale (ATT), Test Strategy (TST), and Time Management (TMT). 2. The classification of student learning strategies obtained consisted of high-level learning strategies; only 42% of students in the 2018/2019 period obtained LASSI scores (75-100). medium learning strategy, and low-level learning strategy. 3. There is a significant relationship between learning strategies and student learning outcomes on the anxiety scale (ANX), motivation (MOT), and test strategy (TST). Significant relationships were also found in the following subscales on concentration (CON), attitude (ATT), and information processing (INP).

Keywords: Learning Strategy, Lassi Instrument, Physics Courses

How to cite: Akbar, I. (2023) Investigating the level of student learning strategies in physics courses through the LASSI Instrument, *Journal of Teaching and Learning Physics* 8(1), 8-16. DOI: <http://dx.doi.org/10.15575/jotalp.v8i1.22978>



1. INTRODUCTION

Learning is an internal process within a learner, in which mental processes occur through knowledge construction and information processing to become new knowledge and skills (Kistner et al. 2015). To become an understanding and skill possessed by a learner, a learning strategy is needed (Fong, 2021). Learning strategies are skills used to gain academic success effectively and efficiently (Pressley et al. 1989; Alexander et al. 1991).

Various research results on learning strategies reveal that one's learning strategies positively influence academic success and performance (Prevatt et al., 2006; Alexander et al., 1998; Zhou et al., 2016; Yip & Chung, 2005; Yip, 2021). Learning strategies are habits that are carried out which contain strong motivation,

attitudes, beliefs, and mentality to obtain and achieve academic goals (Weinstein et al., 2000).

Weinstein et al. (2016) review learning strategies which contain three main components: the skill component, the will component, and the self-regulated component. Each component has its essential subscale. For example, the will component has three subscales: anxiety, attitude, and motivation. The skill component with three subscales includes information processing, selecting main ideas, and test strategies. Moreover, the last self-regulated component includes four subscales: concentration, self-testing, time management, and using academic resources. The three main components of learning strategies and the ten subscales can be seen in Table 1.

Table 1. Three components of learning strategies, ten subscales and descriptions

Components	Subscales	Descriptions
<i>Skill</i>	<i>Information processing</i>	Reasoning, analysis, and critical thinking
	<i>Selectingmainidea</i>	Selection of main ideas
	<i>Test strategies</i>	Self-preparation when and will test
<i>Will</i>	<i>anxiety</i>	Worries about work academic
	<i>attitude</i>	Positive attitude in working on academic assignments
	<i>motivation</i>	Self-discipline, desire to work hard on academic assignments.
<i>Self-Regulated</i>	<i>Concentration</i>	Attention, attention to academic tasks
	<i>Self-testing</i>	Test preparation, review understanding
	<i>Time management</i>	Timing, discipline at study time
	<i>Usingacademicresources</i>	Use of materials and learning tools

Understanding learning strategies in educational research and measuring learning strategies requires highly valid and reliable instruments. Perhaps one of the most adequate measurements in measuring learning strategies is The Learning and Study strategies inventory (LASSI). Not only can students use LASSI to assess their learning strategies, but teachers or educators also use and test their LASSI scores to identify the ten dimensions of the learning strategy (Fong, 2021). Weinstein, Palmer and Acee have developed and revised the LASSI instrument to be highly reliable (0.7 – 0.9). The latest version of LASSI is the third edition, consisting of 60 items.

The research questions will guide the researcher finding in which 1) Are there levels of student learning strategies measured against physics course learning outcomes based on gender? 2) What is the classification of student learning strategies? 3) What is the relationship between student learning strategies and student learning outcomes (GPA)?

2. METHOD

2.1 Research Sample Criteria

The research sample was 65 students of the mathematics education study program, including students in the mathematics

education study program at Tompotika Luwuk University, Banggai, of the 2018/2019 academic year amount 38 students, 2019/2020 amount 17 students, and 2020/2021 amount ten students. The study sample comprised 56% female and 44% male, aged 21 - 31. The average age of the study sample was 23 years. The research sample's semester achievement index (GPA) is between 3.41 - 3.82.

2.2 Instrument

The instrument used in the research was The LASSI 3rd edition, which contains ten subscales with 60 question items revised in 2016 by Claire Weinstein, David Palmer and Taylor Acee; ten scales are shown in the table2. Albaili (1997), Weinstein & Palmer (2002), in Khalil et al. (2019) that the reliability for each scale on the LASSI instrument is 0.73 - 0.89 with good validity (Weinstein et al., 2016).

Table 2. Scale and Descriptions of LASSI Instrument

Scales	Description
ANX	Worries about academic assignments
ATT	Positive attitude in working on academic assignments
CON	Attention, attention to academic tasks
INP	Reasoning, analysis, and critical thinking
MOT	Self-discipline, the desire to work hard on academic assignments
SMI	Selection of main ideas
SFT	Test preparation, review understanding
TST	Self-preparation when and will test

Scales	Description
TMT	Timing, discipline on time
UAR	Use of materials and learning tools

2.3 Data Analysis

Quantitatively, data were analyzed using statistical software. The Pearson product-moment correlation analysis formula was used to measure the relationship between the 10 LASSI scores on student learning outcomes. Qualitatively, data on the 10 LASSI scales were analyzed using Miles and Huberman's analysis to determine the level of student learning strategies on learning outcomes. Categorizing the level of student learning strategies refers to the level of results by Weinstein et al. (2016), as shown in Table 3.

Table 3. Criteria for categorizing the result of the LASSI Instrument

Categories	Percentile Range(%)
High	75-100
Medium	55-75
Low	0-55

3. RESULT AND DISCUSSION

Faculty of Teaching and Education Sciences (FKIP) Student learning strategies in learning physics courses, based on the results of the LASSI instrument reports according to gender, shown in Figure 1.

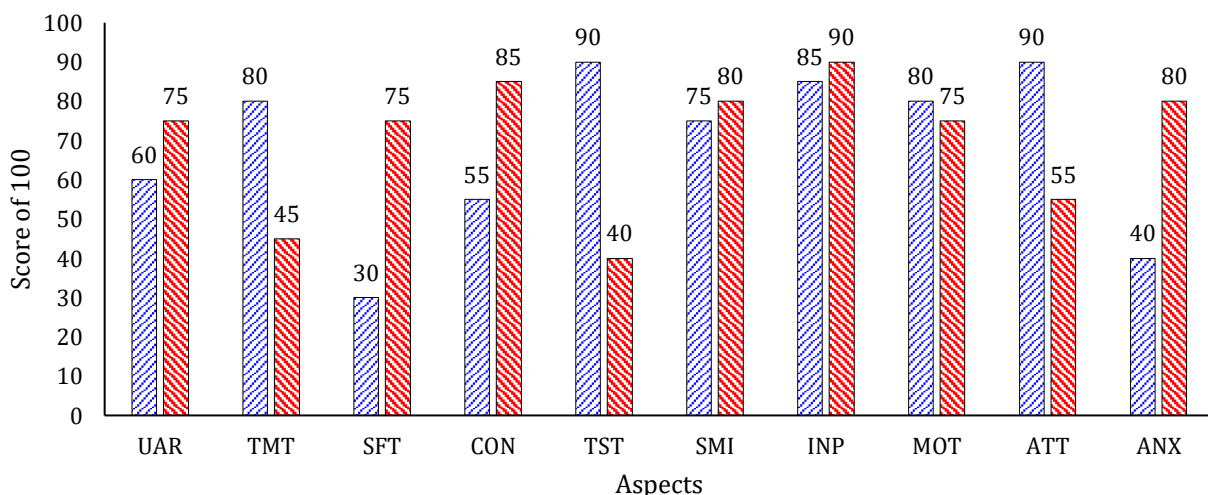


Figure 1. FKIP Student Learning Strategy in Physics Course based on gender (blue: male, red: female)

Classification, the level of student learning strategies, can be categorized into three levels: for the 2018/2019 academic year, the high level is 42%, the medium level is 32%, and the low level is 26%. For the 2019/2020 academic year, the high level is 18%, the medium level is 59%, and the low level is 24%. For the 2020/2021 academic year, student learning strategies are high by 20%, medium level by 50% and low level at 30%. The level of student learning strategies for each level can be seen in Figure 2.

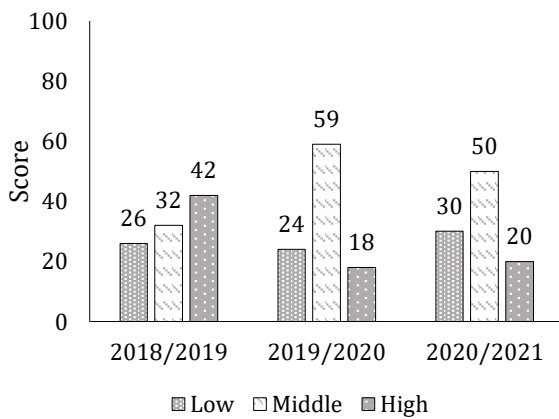


Figure 2. Level of Student Learning Strategies

3.1 Level of Student Learning Strategies

3.1.1 High-Level Learning Strategy

Based on reports from the results of obtaining the LASSI instrument, it was obtained that the student learning strategy group at a high level for the 2018/2019 academic year was 42%. In the 2019/2020 academic year, it was 18%, and in the 2020/2021 academic year, it was 20%. The diagram below shows a drastic decrease in the graph of the level of high learning strategies for 2018/2019 to the 2019/2020 academic year by 24% (42% - 18%).

Then up 2% in the 2020/2021 academic year to 20%. This figure is not significant because it has not reached the percentile of the level of student learning strategies in 2018/2019. The number of high-level student learning strategies can be seen in Following Figure 3.

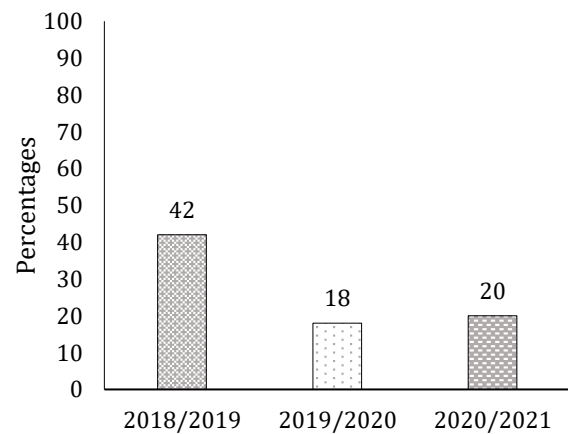


Figure 3. Classification of student learning strategy at a high level (%)

3.1.2 Medium-Level Learning Strategy

Strategic learning outcomes at a medium level for the 2018/2019 academic year were 26%, 59% for the 2019/2020 academic year, and 50% for the 2020/2021 academic year. The medium strategic learning rate from the 2018/2019 academic year has increased by 26% in 2018/2019 to 59% in 2019/2020, which is 33%. The number of student learning strategies for the medium level can be seen in Figure 4.

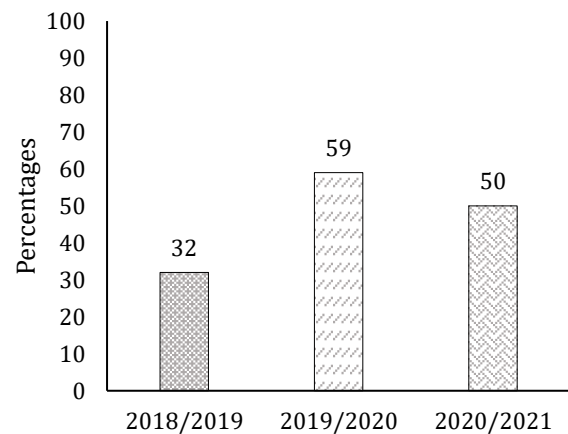


Figure 4. Student learning strategy at medium level

3.1.3 Low-Level Learning Strategy

The results of learning strategies at a low level for the 2018/2019 academic year were 26%, for the 2019/2020 academic year they were 24%, and for the 2020/2021 academic year they were 30%. The low learning strategies from the 2018/2019 academic year decreased

by 2% and then increased by 6%. The increase in low levels from the 2018/2019 academic year to the 2020/2021 academic year is the opposite of the decrease in student learning strategies at high levels in that academic year. The number of student learning strategies for low levels can be seen in Figure 5.

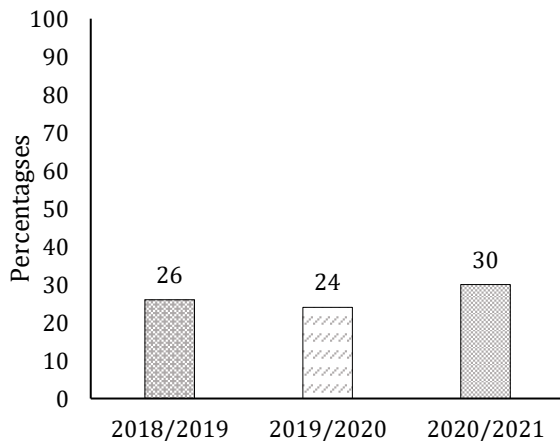


Figure 5. Student learning strategy at Low Level

3.2 The Relationship Between Student Learning Strategy and Student Academic Results

The relationship between student learning strategies and learning outcomes is measured using the Pearson product-moment correlation through the SPSS tool, which can be seen in Table 4

Table 4. The Relationship between Student learning strategies and student learning outcomes

Scale	Learning Outcomes in Physics Courses	
	N = 65 r value	N= 65 p-value
ANX	0.18	0.015
ATT	0.90	0.187
CON	0.21	0.008
INP	0.08	0.319
MOT	0.35	<0.001
SMI	0.15	0.080
SFT	0.13	0.136
TST	0.08	<0.001
TMT	0.17	0.022
UAR	0.45	0.270

Table 4 shows that there is a significant relationship between learning strategies and

student learning outcomes, for high subscales, for example, on the anxiety scale (ANX), motivation (MOT), and test strategy (TST). Each subscale referred to in the results above is related to the learning strategy component, namely the Will and Self-regulated components. In addition, significant relationships were also found in the following subscales, namely concentration (CON), attitude (ATT), information processing (INP), main idea selection (SMI), material review (SFT), time management (TMT), and resource use learning (UAR).

3.3 Discussion

The differences in the terms used in the results of this study which include high, medium and low levels indicate student achievement, namely academic learning outcomes. Descriptively, data from research on student learning strategies according to gender shows that the levels of learning strategies for male and female students are quite diverse. Several research has investigated gender and the effect of gender on learning outcomes (e.g. Boyte-Eckis et al. 2018; Cai et al. 2017; Ramezani et al. 2015; Zhonggen Yu. 2021). Females could achieve higher learning outcomes than males because they were more persistent and committed than males (Richardson & Woodley, 2003). Females had stronger self-regulation than males, leading to significantly more positive learning outcomes than males (Alghamdi et al., 2020).

While in the learning strategy, family dominate with a total of 56% having a moderate learning strategy. The level of student learning strategies at a high level includes anxiety scale (ANX), Concentration (CON), Information Processing (INP), and using academic resources (UAR). Anxiety related to worries during study activities, tests, examinations, or the like related to academic activities. Anxiety is a person's psychological condition full of fear and worry about something that is not certain to happen. According to Mulyasaroh et al. (2020) is a word that describes negative effects and physiological stimulation. In line with that, according to Gunarso (2008) in Wahyudi et al. (2019), anxiety or anxiety is a worry or fear

that is unclear why. Anxiety is also characterized by thinking that everything is confusing and difficult to concentrate or focus thoughts.

As the description of the LASSI results shows, anxiety can interfere with academic success. Academic anxiety can be overcome by developing exercises and skills to reduce excess anxiety to mild anxiety. In terms of overcoming anxiety, Sohail (2013) found that students used a combination of coping strategies to deal with stress. These strategies can be categorized into problem-solving (e.g., discussion with peers) and focusing on emotions (e.g., walking, exercising, etc.). However, a higher level of achievement of learning success is achieved through problem-solving strategies.

Test strategy means preparing someone to face an exam or test. Skills in managing exam preparation plans are part of a student's learning strategy. While the strategy test is related to self-preparation when taking a test or exam. Previous studies have shown that anxiety and test strategies significantly predict student learning outcomes (Khalil et al., 2018; Cano, 2006). Additional studies have also shown a relationship between academic stress and motivation (Fairchild et al., 2005; Robins et al., 2009). Testing tests through LASSI can teach students about the test preparation strategies (for example, what type of exam it is and whether the test requires a reasoning process to reach the answer the teacher wants). Unsurprisingly, undergraduate students have difficulties related to their academic achievement (for example, students with a GPA < 2.5). They also have weaknesses in strategy tests and anxiety in the form of skills in test preparation, but they are different compared to students who get GPA scores > 3.5 or higher.

In addition, apart from the three components of skill, will, and self-regulation with ten dimensions, LASSI with ten subscales can be grouped into three habits. The first is Habits of Learning, featuring information processing, selecting main ideas, self-testing, testing strategies, and using academic resources. The

second Habit of Mind focuses on anxiety and concentration, and the third Habit of Professional focuses on self-regulation related to motivation, attitude, and time management (Abigail et al. 2021). As in this study, groups of students who have low learning strategies are influenced by habit of mind (anxiety), habit of professionalism (motivation) and habit of learning (test strategies).

4. CONCLUSION

This study uses the LASSI instrument, which includes ten subscales, to investigate the student learning strategies in physics courses; and the relationship between learning strategies and student learning outcomes in the form of academic achievement. The level of student learning strategies is categorized as high, medium, and low. For the 2018/2019 academic year, high levels are 42%, medium is 32%, and low is 26%. For the 2019/2020 academic year, the high rate is 18%, the medium is 59%, and the low is 24%. For the 2020/2021 academic year, student learning strategies are high by 20%, medium by 50%, and low by 30%. A significant relationship was obtained in this study between anxiety, motivation, and strategy tests for students who had GPA < 2.5. This shows that high anxiety, lack of motivation, and lack of exam preparation are related to a student's academic achievement. With this activity of identifying deficiencies and weaknesses, it is necessary for a preventive effort to evaluate material and attention to student learning achievement.

5. REFERENCES

- Stephan, A. T., Harcum, J., Whisler, L., & Stephan, E. A. (2021, July). Using the Learning and Study Strategies Inventory (LASSI) to Track Students' Growth and Evaluate the Effectiveness of a Learning Strategies Course. In *2021 ASEE Virtual Annual Conference Content Access*.
- Alexander, P. A., Murphy, P. K., & Guan, J. (1998). The learning and study strategies of highly able female students in Singapore. *Educational Psychology*, *18*(4), 391-407.

- <https://doi.org/10.1080/0144341980180403>.
- Alexander, P. A., Schallert, D. L., & Hare, V. C. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of Educational Research*, 61(3), 315-343. <https://doi.org/10.3102/00346543061003315>.
- Alghamdi, A., Karpinski, A. C., Lepp, A., & Barkley, J. (2020). Online and face-to-face classroom multitasking and academic performance: Moderated mediation with self-efficacy for self-regulated learning and gender. *Computers in Human Behavior*, 102, 214-222. <https://doi.org/10.1016/j.chb.2019.08.018>.
- Boyte-Eckis, L., Minadeo, D. F., Bailey, S. S., & Bailey, W. C. (2018). Age, gender, and race as predictors of opting for a midterm retest: A statistical analysis of online economics students. *The Journal of Business Diversity*, 18(1), 17-28.
- Cai, Z., Fan, X., & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers & Education*, 105, 1-13.
- Cano, F. An in-depth analysis of the learning and study strategies inventory (LASSI). (2006). *Educ Psychol Meas*. 66:1023-38.
- Fairchild AJ, Horst SJ, Finney SJ, Barron KE. (2005). Evaluating existing and new validity evidence for the academic motivation scale. *Contemp Educ Psychol*. 30:331-58.
- Fong, C. J., Krou, M. R., Johnston-Ashton, K., Hoff, M. A., Gonzales, C., & Lin, S. (2021). LASSI's great adventure: A systematic review and meta-analysis of the Learning and Study Strategies Inventory. *Educational Research Review*, 34. <https://doi.org/10.1016/j.edurev.2021.100407>.
- Frances Prevatt, Yaacov Petscher, Briley E. Proctor, Abigail Hurst, and Katharine Adams. (2006). The Revised Learning and Study Strategies Inventory: An Evaluation of Competing Models. *Educ Psychol Meas*. 66(3): 448-458. <https://doi:10.1177/0013164405282454>.
- Khalil MK, Williams SE, Hawkins HG. (2018). Learning and study strategies correlates with medical students' performance in anatomical sciences. *Anat Sci Educ*. 11(3):236-42. <https://doi.org/10.1002/ase.1742>.
- Pressley, M., Goodchild, F., Fleet, J., Zajchowski, R., & Evans, E. D. (1989). The challenges of classroom strategy instruction. *The Elementary School Journal*, 89, 301-342. <https://doi.org/10.1086/461578>.
- Ramezani, A. E., Dehgani, M., & Hashemi, H. (2015). An exploratory study of the language-learning style preferences of Iranian EFL high school students. *Advances in Language and Literary Studies*, 6(2). <https://doi.org/10.7575/ajac.alls.v.6n.2p.150>
- Robbins, S. B., Oh I. S., Le, H., & Button C. (2009). Intervention effects on college performance and retention as mediated by motivational, emotional, and social control factors: integrated meta-analytic path analyses. *J Appl Psychol*. 94:1163-84.
- Richardson, J. T., & Woodley, A. (2003). Another look at the role of age, gender and subject as predictors of academic attainment in higher education. *Studies in Higher Education*, 28(4), 475-493.
- Saskia Kistner, Katrin Rakoczy, Barbara Otto, Eckhard Klieme & Gerhard Büttner. (2015). Teaching learning strategies: The role of instructional context and teacher beliefs. *Journal for Educational Research Online*. 07(01), 176-197.
- Sohail, N. (2013). Stress and Academic Performance among medical student. *J Coll Physicians SurgPak*. 23(1): 67-71.
- Wahyudi, I., Bahri, S., & Handayani, P. (2019). Aplikasi Pembelajaran Pengenalan Budaya Indonesia. *Jurnal Teknik Komputer*, 5(1), 71-76. <http://doi.org/10.31294/jtk.v4i2>.
- Weinstein, C. E., Husman, J., & Dierking, D. R. (2000). Self-regulation interventions focus on learning strategies. In M. Boekaerts, P. R. Pintrich, & M. Zeidner

- (Eds.), *Handbook of self-regulation*. Academic Press.
<https://doi.org/10.1016/B978-012109890-2/50051-2>.
- Weinstein, C. E., Palmer, D. R., & Acee, T. W. (2016). *LASSI 3rd Edition Learning and Study Strategies Inventory*. Clearwater, FL: H&H Publishing.
- Yip, M. C. W., & Chung, O. L. L. (2005). Relationship of study strategies and academic performance in different learning phases of higher education in Hong Kong. *Educational Research and Evaluation*, 11(1), 61-70.
<https://doi.org/10.1080/13803610500110414>.
- Yip, M. C. W. (2021). The linkage among academic performance, learning strategies, and self-efficacy of Japanese university students: A mixed-method approach. *Studies in Higher Education*, 46(8), 1565-1577.
<https://doi.org/10.1080/03075079.2019.1695111>.
- Zhou, Y., Graham, L., & West, C. (2016). The relationship between study strategies and academic performance. *International Journal of Medical Education*, (7):324-332.
<https://doi.org/10.5116/ijme.57dc.fe0f>
- Zhonggen, Y. (2021). The effect of gender, educational level, and personality on online learning outcomes during the COVID-19 Pandemic. *International Journal of Educational Technology in Higher Education*.
<https://doi.org/10.1186/s41239-021-00252-3>.