

The Impact of Learning Skills on Academic Achievement and Learning Outcomes in High School

Asri^{1*}, Asniwati², Irwan³ 

^{1,2,3} Institut Teknologi dan Bisnis Nobel Indonesia, Makassar, Indonesia

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ABSTRAK

Dalam memperoleh prestasi dan hasil belajar siswa, siswa harus mempunyai keterampilan dan kemampuan yang baik. Namun faktanya masih banyak siswa yang mempunyai prestasi dan hasil belajar yang rendah. Hal ini mendesak untuk diteliti karena terdapat perbedaan antara harapan teoretis dan kenyataan untuk menganalisis keterampilan belajar dan prestasi akademik dalam kelompok serta menganalisis perbedaan keterampilan belajar antara siswa laki-laki dan perempuan. Metode dalam penelitian ini adalah kuantitatif dengan uji ANOVA. Subyek penelitian ini adalah siswa SMA sebanyak 180 orang. Teknik pengumpulan data menggunakan instrumen pembelajaran keterampilan yang terdiri dari dua bagian. Bagian pertama berisi demografi responden. Bagian kedua juga berisi pertanyaan-pertanyaan mengenai keterampilan belajar. Instrumen dinilai dengan skala kritis 1 sampai 5 dengan mendistribusikan instrumen menggunakan Google. Teknik analisis data menggunakan SPSS Versi 25.0. Analisis data dianalisis menggunakan uji korelasi Pearson untuk mengukur hubungan antara keterampilan belajar dengan prestasi akademik. Hasil dan temuan menunjukkan bahwa hasil ujian menunjukkan tidak terdapat perbedaan keterampilan belajar yang signifikan pada siswa tingkat IV yang berbeda jenis kelamin. Hasil uji ANOVA menunjukkan terdapat perbedaan keterampilan belajar antar siswa dalam mencapai prestasi akademik. Uji korelasi Pearson menunjukkan terdapat hubungan positif antara kemampuan belajar dengan prestasi akademik. Kesimpulannya, dalam memperoleh prestasi dan hasil belajar, tetap diperlukan keterampilan belajar individu siswa dan prestasi akademik yang baik.

ABSTRACT

In obtaining student achievements and learning outcomes, students must have good skills and abilities. However, the fact is that many students still have low achievement and learning outcomes. This is urgent to research because there is a difference between theoretical expectations and reality to analyze learning skills and academic achievement within groups and to analyze differences in learning skills between male students and female students. The method in this research is quantitative by testing ANOVA. The subjects were 180 high school students. Data collection technique is using a learning skills instrument that contains two parts. The first section contains the demographics of the respondents. The second part also contains questions regarding learning skills. Instruments are assessed on a critical scale of 1 to 5 by distributing instruments using Google. A data analysis technique is using SPSS Version 25.0. Data analysis was analyzed using the Pearson correlation test to measure the relationship between learning skills and academic achievement. The results and findings show that the exam results show that there are no significant differences in learning skills among fourth-level students of different genders. ANOVA test results show that there are differences in learning skills among students in achieving academic achievement. The Pearson correlation test shows that there is a positive relationship between learning proficiency and academic achievement. The conclusion is that in obtaining achievements and learning outcomes, individual student learning skills and good academic performance are still needed.

1. INTRODUCTION

Learning is an activity that depends on cognitive skills and psychologists. The differentiate brain mechanisms used in learning from the factors that drive these mechanisms (Conway, 2020; Bahtiyar et al.,

2020). The factors that drive these mechanisms are called drives and attitudes, while the learning mechanisms are called learning skills (Zhang et al., 2020; Mahfud et al., 2020). Every student at school hopes to achieve success both in the academic and co-curriculum fields. Success in the academic field is something that is not impossible if students acquire effective learning methods or strategies (Didin Sonmez et al., 2021; Chen et al., 2021). Various factors contribute to student success, such as intellectual intelligence, excessive effort, more focus during the teaching and learning process, and solid learning strategies (Thomas & Mengel, 2008; Scheibenzuber et al., 2021). Teachers and parents need to play an important role in the learning process. Teachers should understand ways to influence changes in student behavior through various educational experiences. One way to help teachers direct the learning process is through an understanding of learning theories that have been produced from formal experiments. Parents should also act as encouragement and encourage and strengthen learning skills among their children.

Learning skills according to previous study learning skills are the ability to carry out learning activities effectively (Behnamnia et al., 2020). These skills are explained in detail as follows: Self-discipline. Self-discipline is a very important aspect of learning. In self-discipline various steps need to be taken, including starting tasks quickly, determining the tasks to be carried out, providing a period to complete the tasks, studying within the specified period, dividing up the study period, and providing a study schedule (Elfeky et al., 2020; Lee et al., 2020). In addition, individuals need to study learning behavior to achieve active learning. Concentration in thinking needs to be given attention even though the lesson being faced is difficult. In this regard, self-discipline can be considered as an individual's seriousness in complying with learning rules and can be carried out if the student has a positive self-metacognitive awareness (Avant & Gillespie, 2019; Cardin et al., 2020).

Learning skills closely related to memory skills. Memory is an intellectual process that stores information and experiences mentally and can be retrieved to solve problems or used for further learning. The way to strengthen memory is through focusing memory and if students are faced with a stimulus, they will tend to concentrate and focus their thoughts on certain things only (Powers & Mandal, 2011; Smith & Monforte, 2020; Villacís et al., 2022). Previous study explains that memory is divided into three systems, namely sensory memory, short-term memory, and long-term memory (Wang et al., 2020). The most appropriate memory begins with sensory recording activity or sensory memory. This memory only lasts for a short period, namely less than one moment, for example, the memory of typing. If something is processed and recognized as meaningful or relevant, it will be transferred to short-term memory (Langum & Sullivan, 2020; Listyaningsih, 2017). The ability to remember is the most important thing in learning. The extent to which it can be increased depends on the student's abilities and achievements. This can be learned and improved through continued practice. Reinforcing learning using tubi training techniques can strengthen students' memory when learning occurs.

To confirm this argument, we naturally refer to a recent study made by previous study regarding the assessment of independent learning programs for students who have mathematical strengths but low achievement at lower school levels (Sember et al., 2020). The results of the study show that there are changes in academic achievement if students with problems are helped with various methods such as time management. Therefore, there was a change in the controlled group from -0.16 to the maintained group which increased to 0.17. This coincides with what was stated by other study that found in Germany and Spain show that positive factors such as interest and concentration in reading will influence reading, in turn helping students understand reading material with a value of $y = 0.21$ (Mas-Tur et al., 2020). Negative factors such as students' failure to attend school, late attendance at school, and not doing homework indicate low achievement in reading and academic achievement (Byrnes, 2020; Dimova, 2020; Zaid et al., 2022). Moreover other study found that the value of learning and learning achievement need to be accompanied by meaningful learning skills (Lin, 2020). Other study also show that tertiary students experience problems with learning skills. Information Technology students showed a minimum score of 2.98, English (2.54), Education (2.38), and Sports students (1.71) (van Oers, 2018). The reviewer has concluded that learning skills and learning outcomes among students are different and it is the teacher's role to identify these types of differences whether they are classified as successful students, students who are easily satisfied, or lazy students.

The study above is in line with the findings which explains that each student's learning skills are different from each other (Papavlasopoulou et al., 2020). These differences can be felt from various aspects such as gender, physical shape, behavior, way of thinking, way of interacting, learning skills, and the cognitive style that students choose to obtain new information. As a student, they must understand their learning style. However, in reality, in practice, it is difficult for students to take various steps, including understanding and accepting learning styles that can be adapted to improve academic achievement and creativity. These studies show that students consider study skills to be related to their academic achievement, which is contrary to the reality on the ground.

The urgency in this research is the existence of a gap between theory, expectations, and reality in the field. Specifically for learning skills which can be formulated as metacognitive awareness that exists within students to learn as well as possible to obtain information that is useful for learning. In theory, learning skills are the abilities that students have in mastering learning principles such as self-discipline, reading skills, listening skills, note-taking skills, and memory skills which will make it easier for them to understand information. However, in reality in the field, even though students have applied theory, the achievements obtained by students are still far from expectations. The aim of this study is to analyze learning skills and academic achievement within groups and to analyze differences in learning skills between male students and female students. The novelty of this research focus to identify differences in learning skills between male and female students, identifying differences in learning skills in students with various academic achievement groups such as intelligent, simple, and weak students, as well as analyzing differences in learning skills between students who study in the city and students studying outside the city and identify the relationship between study skills and academic achievement.

2. METHOD

This The method used in this research is a quantitative approach (Onen D., 2016; Khaldi, 2017). This quantitative study uses research questions to obtain two types of information, namely learning skills and academic achievement (Iglesias-Pradas et al., 2021). The objects studied include learning skills that focus on self-discipline, listening skills, reading skills, note-taking skills, and memory skills. while the subjects in this research were high school students who had different abilities. School selection is also made based on the location of the school within the city and outside the city. The selection of these two schools was based on the presence of students with various abilities, such as students in good, medium, and weak classes. The sample in this research was carried out through a stratified sampling process. A random selection was carried out involving 30 people from each good, medium, and weak class category based on the 2022 exam results. 180 high school students were selected as research subjects, representing 10% of second-grade students. The selection of subjects was balanced based on gender, namely 90 male students and 90 female students. women who represent three variations of academic ability, namely intelligent, humble, and weak. Subject selection is carried out using exam decisions and the student's ability position in the class. The selection of school samples was carried out randomly based on school locations in urban and non-urban areas, namely Jakarta and Bekasi, West Java.

The data collection technique in this research uses instruments. The instrument was developed from research indicators used as measuring tools, namely learning skills and academic achievement. This research uses measuring tools in the form of a learning skills questionnaire to obtain information about the research and will also look at differences in learning skills between students of various academic abilities, locations, and genders. One of the research questions that has been used is a learning skills question that has been modified in certain parts (Feng et al., 2020; Valtonen et al., 2021). Instruments were distributed to all 180 students. Instruments were given to students via a Google link prepared by researchers. The instrument is given an assessment score from a scale of 1 to 5, with a specific scale as an assessment. Indicators and Number of research questions is show in Table 1.

Table 1. Indicators and Number of Research Questions

Field	Number of Questions
Self-Discipline	14
Reading Skills	8
Listening Skills	8
Note Taking Skills	7
Memory Skills	9

Data analysis techniques using SPSS Version 26.0. Data analysis is used to see the mean, standard deviation, ANOVA and relationship. Before data analysis was carried out, the research first ensured validity and trustworthiness, carried out using 50 research subjects. The alpha reliability test results showed a high reading of 0.921 for all 46 research question items. The validity test using Kaiser Meyer Olkin (KMO) and Bartlett's showed that the validity value obtained was also high, namely 0.933 for the 46 question items that were answered by students. This research question is divided into two parts, namely parts A and B. Part A contains questions related to student demographics. Part B also contains questions that probe PMR study skills and academic performance. The skills learning instrument used in this research consists of five parts with 46 items.

3. RESULT AND DISCUSSION

Result

The results of this research are presented starting from learning limitations. From the two schools that distributed the instrument, namely a school located in an urban area and a school located outside a randomly selected city, the assessment results showed that 10% of the total students selected representing the entire fourth-level population in the area demonstrated good skills. Students providing assessments in obtaining good decisions in learning and regarding the learning skills mastered by students, should not apply discipline and skills, both general skills and special skills. The results of this research investigation are limited and cannot be completely generalized to all students. Apart from that, the results of the research conducted only focused on five elements of learning skills, namely self-discipline, reading skills, listening skills, note-taking skills, and memory skills. The research results also show that there is no significant difference between the learning skills of second-grade high school students of different genders. Results of analysis of differences in learning skills based on gender is shown in [Table 2](#).

Table 2. Results of Analysis of Differences In Learning Skills Based on Gender

t	p	Degrees of Freedom	alpha	F
1.623	0.106	177	0.05	2067.110

The results in [Table 2](#) show the value of $t = 1.623$ and $p = 0.106$. This shows that the p -value is greater than the alpha value of 0.05 ($p = 0.106 > 0.05$). Therefore, the assessment of learning proficiency based on gender is not significant at the $p > 0.05$ level. Meanwhile, the results of the analysis of variance (ANOVA) hypothesis test of students' learning skills from various academic achievement groups showed a value of $F = 2067.110$, degrees of freedom = 177 at an understanding level of $p = 0.000$, namely $p < 0.05$, which is very important. Therefore, the research results show that there are significant differences in learning skills between the groups of intelligent, simple, and weak students. The result of tukey post hoc ANOVA test is shown in [Table 3](#).

Table 3. Tukey Post Hoc ANOVA Test

t	p	Degrees of Freedom	alpha	r
$t = 0.565$	$p = 0.573$	177	0.05	0.968

Based on [Table 3](#), the pairs that are significantly different are as follows: 1) The pairs of good, simple, and weak groups have significant differences from each other based on a significance value of 0.000 (for the Tukey test) which is smaller than the significance value of $p < 0.05$, 2) The pairs of simple good and weak groups have significant differences from each other based on a significance value of 0.000 (for the Tukey test) which is smaller than the significance value of $p < 0.05$ and 3) The pairs of weak, good, and simple groups have significant differences. significant to each other based on a significance value of 0.000 (for the Tukey test) which is smaller than a significance value of $p < 0.05$. These results also show that there is no significant difference in learning skills between subjects who study in the city and subjects who study outside the city. Analysis shows the value of $t = 0.565$, $p = 0.573$. This shows that the p -value is greater than the alpha value = 0.05 ($p = 0.565 > 0.05$).

Therefore, the decision of learning proficiency between students studying in the city and outside the city is not significant at the level of understanding $p = 0.05$. Meanwhile, the results of the analysis of the relationship between learning skills and learning achievement also show that there is a positive relationship with a value of $r = 0.968$ at an understanding level of $p = 0.00$, namely $p < 0.05$. These findings indicate that there is a significant relationship between learning skills and the academic achievement of students who occupy PMR. Therefore, it can be said that there is a significant relationship between learning ability and the academic achievement of students who take the PMR exam.

Discussion

Differences in learning skills were found based on gender, various achievement groups, school location, and academic achievement. It was found that there was no significant difference between the study skills of second-grade high school students of different genders, namely boys and girls. The findings of this research are in line with the findings of previous research which stated that male students have differences in academic achievement from female students ([Kucuk & Sisman, 2020](#)). In research, it was found that there were no differences in learning skills among students of various genders. This is based on

Gessel's maturity theory and Jean Piaget's cognitive theory which states that when they reach the maturity stage, a child, regardless of gender, can master learning skills. Students can be considered to have matured and reached cognitive maturity to master learning skills. However, this is contrary to research conducted by other study which found that there was a difference between learning skills and academic achievement (Akpur, 2020). Other study explains that the learning skills of each student are different from each other (Kozhevnikov et al., 2014). This difference can be felt from various aspects such as gender, physical form, behavior, way of thinking, way of interacting, learning skills, and the cognitive style that students choose to obtain new information. As different learners, they must understand their learning skill styles. This can be done by students by taking various steps including understanding and accepting learning styles that can be adapted for the sake of increasing academic achievement and creativity (Kipper et al., 2020; Subasi et al., 2019). The results of study too shows continuity with studies made by other study which stated that female students have better learning skills than male students (Alghamdi et al., 2020). The findings of this research also show that there are differences in learning skills among students in various academic achievement groups. The results of the subject analysis found differences in learning skills between students consisting of intelligent, simple, and weak students. Analysis carried out using the ANOVA post hoc test showed that the pairs of light, medium, and weak groups had significant differences from each other based on a significance value of 0.000 (for the Tukey test) which was smaller than the significance value of $p < 0.05$. The same decision is also seen in the simple group pair with light and weak which have significant differences from each other based on a significance value of 0.000 (for the Tukey test) which is smaller than the significance value of $p < 0.05$.

The findings of this study are actually in line with the opinions expressed by several previous researchers such as the study regarding the prospects for self-directed learning processes in Bestari schools, which found that there is a high correlation between awareness of learning and the use of self-directed learning methods using information technology (Suparman & Arifin, 2021). In this context, students at bestiary schools, namely students in the bright category, realize that self-directed learning skills help towards their academic achievement. Students also realize that the influence of motivation influences learning and subsequently helps academic achievement. This finding is also synonymous with the results of study which states that students who have better learning skills consist of a group of students who are in the brilliant student category (Huang et al., 2020). The results of the next analysis show that there is no difference in learning skills between students who go to school in the city and students who go to school outside the city. This case explains that students who study in cities and outside cities have the same pattern of learning skills. The findings of this study support the view expressed language difficulties among foreign students in Australia show that several factors contribute to solid language mastery without involving the location of learning (Alam et al., 2020). The exam proves that the learning proficiency variable has a strong relationship with academic achievement in achieving PMR. This finding has continuity with the view who stated that students who have high learning skills will obtain high academic results (Davis et al., 2020). To support this argument, the reviewer refers to the findings of a study regarding the assessment of independent learning programs for students who have mathematical strengths but low achievement at lower school levels (Butler-Henderson & Crawford, 2020; Vidergor & Ben-Amram, 2020). The results of the study show that there is a positive relationship between academic aspirations and mathematics achievement which has a value of $r = 0.66$ ($p < 0.05$). These findings explain that there are changes in academic achievement if students with problems are helped with various methods such as time management. These findings support the view that there is a positive relationship between learning skills and academic achievement.

The implications of this research are to provide several implications, especially for schools, parents, and students themselves. The following implications are worth noting so that careful and systematic design can be implemented: the need to improve learning skills among students. These learning skills are skills that most students in Indonesia fail to master. Often, they assume that if they start studying then learning skills will be mastered indirectly. This is a misperception because students do not realize the importance of learning skills. For low achieving students, they assume that being a student means they have mastered learning skills. Every year we are faced with stories of the success of brilliant students in public exams in our country. However, it is different for students who are in the simple and weak category in academic achievement. Students in the weak and moderate categories need to be exposed to learning skills from an early age so they can apply them at the start of school. This indirectly leads to an increase in students' overall academic performance. One example of a program that has been successfully implemented to improve learning skills is the daily diary program recommended by the High School Teachers' Association.

The limitation of this research did not go into analyzing parental involvement in looking at student discipline, skills, and achievements. Parents must understand the importance of study skills for

students when facing public exams. The relationship between study skills and positive academic achievement also carries the message that parents must realize that students who are brilliant and successful in exams are having brilliant learning skills. To continue this, parents must provide a comfortable study space for children so they can practice study skills in more detail. Parents can play an important role by monitoring learning skills at home. Parents can help design with their children a comfortable study schedule. In addition, parents can help by providing a comfortable space for students at home. Having a mini library at home can improve the reading culture and create a comfortable learning atmosphere. Studies by psychologists show that a place that stimulates a sense of learning is the library. So, this research recommends that further research be carried out and involve parents as subjects in subsequent research. The research results show that the learning skills mastered by students need to be varied. Study skills are not only represented by the elements of reading, remembering, taking notes, listening, and self-discipline but also include problem-solving skills, managing time, and so on. Students must know all the elements of learning skills to be able to use them in the learning process. In addition, mastering more than one learning skill will make it easier for students to focus their full attention during the teaching and learning process.

4. CONCLUSION

This research sensitizes students, parents, and teachers about the relationship between students' study skills and their academic performance. The results and findings of this research are in line with previous research and this research convinces many people of the importance of study skills in producing good academic achievement. Research has also revealed the confessions of students who were good or brilliant in their exams, stating that the success they achieved was influenced by their abilities and good learning process skills. In a situation like this, it can be said that a culture of prioritizing learning skills will have a positive impact on the increase in exam questions and the decision to give students learning achievement scores in urban schools and to students who are outside urban areas.

5. REFERENCES

- Akpur, U. (2020). Critical, Reflective, Creative Thinking and Their Reflections on Academic Achievement. *Thinking Skills and Creativity*, 37(July), 1-8. <https://doi.org/10.1016/j.tsc.2020.100683>.
- Alam, G. M., Al-Amin, A. Q., Forhad, A. R., & Mubarak, M. S. (2020). Does the private university sector exploit sustainable residential life in the name of supporting the fourth industrial revolution? *Technological Forecasting and Social Change*, 159(July), 120200.1-13. <https://doi.org/10.1016/j.techfore.2020.120200>.
- 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(February 2019), 214-222. <https://doi.org/10.1016/j.chb.2019.08.018>.
- Avant, N. D., & Gillespie, G. L. (2019). Pushing for health equity through structural competency and implicit bias education: A qualitative evaluation of a racial/ethnic health disparities elective course for pharmacy learners. *Currents in Pharmacy Teaching and Learning*, 11(4), 382-393. <https://doi.org/10.1016/j.cptl.2019.01.013>.
- Bahtiyar, S., Gulmez Karaca, K., Henckens, M. J. A. G., & Roozendaal, B. (2020). Norepinephrine and glucocorticoid effects on the brain mechanisms underlying memory accuracy and generalization. *Molecular and Cellular Neuroscience*, 108(July), 103537.1-10. <https://doi.org/10.1016/j.mcn.2020.103537>.
- Behnamnia, N., Kamsin, A., Ismail, M. A. B., & Hayati, A. (2020). The effective components of creativity in digital game-based learning among young children: A case study. *Children and Youth Services Review*, 116(March 2020), 105227.1-13. <https://doi.org/10.1016/j.childyouth.2020.105227>.
- Butler-Henderson, K., & Crawford, J. (2020). A systematic review of online examinations: A pedagogical innovation for scalable authentication and integrity. *Computers and Education*, 159(May), 104024.1-12. <https://doi.org/10.1016/j.compedu.2020.104024>.
- Byrnes, J. P. (2020). The potential utility of an opportunity-propensity framework for understanding individual and group differences in developmental outcomes: A retrospective progress report. *Developmental Review*, 56(March), 100911.1-20. <https://doi.org/10.1016/j.dr.2020.100911>.
- Cardin, V., Grin, K., Vinogradova, V., & Manini, B. (2020). Crossmodal reorganisation in deafness: Mechanisms for functional preservation and functional change. *Neuroscience and Biobehavioral Reviews*, 113(March), 227-237. <https://doi.org/10.1016/j.neubiorev.2020.03.019>.

- Chen, J., Kolmos, A., & Du, X. (2021). Forms of implementation and challenges of PBL in engineering education: a review of literature. *European Journal of Engineering Education*, 46(1), 90–115. <https://doi.org/10.1080/03043797.2020.1718615>.
- Conway, C. M. (2020). How does the brain learn environmental structure? Ten core principles for understanding the neurocognitive mechanisms of statistical learning. *Neuroscience and Biobehavioral Reviews*, 112(February), 279–299. <https://doi.org/10.1016/j.neubiorev.2020.01.032>.
- Davis, F. M., Dendekker, A., Joshi, A., Wolf, S., Moore, B., Lukacs, N., & Gallagher, K. (2020). Epigenetic Regulation of Toll-like Receptor 4 Signaling Modulates Macrophage Phenotype and Impairs Diabetic Wound Healing. *Journal of Vascular Surgery*, 72(1), e260. <https://doi.org/10.1016/j.jvs.2020.04.431>.
- Didin Sonmez, F., Cuhadar, S., & Kahvecioglu, M. K. (2021). Successes, challenges, and next steps in implementing outcome-based assessment: The case of Istanbul Bilgi University Library. *Journal of Academic Librarianship*, 47(1), 102249.1-8. <https://doi.org/10.1016/j.acalib.2020.102249>.
- Dimova, S. (2020). English language requirements for enrolment in EMI programs in higher education: A European case. *Journal of English for Academic Purposes*, 47(September 2020), 100896.1-40. <https://doi.org/10.1016/j.jeap.2020.100896>.
- Elfeky, A. I. M., Masadeh, T. S. Y., & Elbyaly, M. Y. H. (2020). Advance organizers in flipped classroom via e-learning management system and the promotion of integrated science process skills. *Thinking Skills and Creativity*, 35(March 2020), 100622.1-32. <https://doi.org/10.1016/j.tsc.2019.100622>.
- Feng, Y., Marchal, T., Sperry, T., & Yi, H. (2020). Influence of wind and relative humidity on the social distancing effectiveness to prevent COVID-19 airborne transmission: A numerical study. *Journal of Aerosol Science*, 147(April), 105585.1-19. <https://doi.org/10.1016/j.jaerosci.2020.105585>.
- Huang, S. Y., Kuo, Y. H., & Chen, H. C. (2020). Applying digital escape rooms infused with science teaching in elementary school: Learning performance, learning motivation, and problem-solving ability. *Thinking Skills and Creativity*, 37(129), 100681. <https://doi.org/10.1016/j.tsc.2020.100681>.
- Iglesias-Pradas, S., Hernández-García, Á., Chaparro-Peláez, J., & Prieto, J. L. (2021). Emergency remote teaching and students' academic performance in higher education during the COVID-19 pandemic: A case study. *Computers in Human Behavior*, 119. <https://doi.org/10.1016/j.chb.2021.106713>.
- Khalidi, K. (2017). Quantitative, qualitative or mixed research: which research paradigm to use? *Journal of Educational and Social Research*, 7(2), 15–15. <https://doi.org/10.5901/jesr.2017.v7n2p15>.
- Kipper, L. M., Furstenuau, L. B., Hoppe, D., Frozza, R., & Iepsen, S. (2020). Scopus scientific mapping production in industry 4.0 (2011–2018): a bibliometric analysis. *International Journal of Production Research*, 58(6), 1605–1627. <https://doi.org/10.1080/00207543.2019.1671625>.
- Kozhevnikov, M., Evans, C., & Kosslyn, S. M. (2014). Cognitive style as environmentally sensitive individual differences in cognition: A modern synthesis and applications in education, business, and management. *Psychological Science in the Public Interest, Supplement*, 15(1), 3–33. <https://doi.org/10.1177/1529100614525555>.
- Kucuk, S., & Sisman, B. (2020). Students' attitudes towards robotics and STEM: Differences based on gender and robotics experience. *International Journal of Child-Computer Interaction*, 23–24(June 2020), 100167.1-8. <https://doi.org/10.1016/j.ijcci.2020.100167>.
- Langum, V., & Sullivan, K. P. H. (2020). Academic writing, scholarly identity, voice and the benefits and challenges of multilingualism: Reflections from Norwegian doctoral researchers in teacher education. *Linguistics and Education*, 60(December 2020), 100883.1-10. <https://doi.org/10.1016/j.linged.2020.100883>.
- Lee, Y. C., Shariatfar, M., Rashidi, A., & Lee, H. W. (2020). Evidence-driven sound detection for prenotification and identification of construction safety hazards and accidents. *Automation in Construction*, 113(January 2019), 103127.1-16. <https://doi.org/10.1016/j.autcon.2020.103127>.
- Lin, G. Y. (2020). Scripts and mastery goal orientation in face-to-face versus computer-mediated collaborative learning: Influence on performance, affective and motivational outcomes, and social ability. *Computers and Education*, 143(January 2020), 103691.1-36. <https://doi.org/10.1016/j.compedu.2019.103691>.
- Listyaningsih, T. (2017). The Influence of Listening English Song to Improve Listening Skill in Listening Class. *Journal of Multidisciplinary Studies*, 1(1), 35–49. <https://ejournal.uinsaid.ac.id/index.php/academica/article/view/601>.
- Mahfud, T., Triyono, M. B., Sudira, P., & Mulyani, Y. (2020). The influence of social capital and entrepreneurial attitude orientation on entrepreneurial intentions: the mediating role of psychological capital. *European Research on Management and Business Economics*, 26(1), 33–39.

- <https://doi.org/10.1016/j.iedeen.2019.12.005>.
- Mas-Tur, A., Kraus, S., Brandtner, M., Ewert, R., & Kürsten, W. (2020). Advances in management research: a bibliometric overview of the Review of Managerial Science. *Review of Managerial Science*, 14(5), 933–958. <https://doi.org/10.1007/s11846-020-00406-z>.
- Onen D. (2016). Conceptualisation : The Foundation of Any Solid Quantitative. *The Electronic Journal of Business Research Methods*, 14(1), 28–38. <https://academic-publishing.org/index.php/ejbrm>.
- Papavlasopoulou, S., Sharma, K., & Giannakos, M. N. (2020). Coding activities for children: Coupling eye-tracking with qualitative data to investigate gender differences. *Computers in Human Behavior*, 105(7491), 1–11. <https://doi.org/10.1016/j.chb.2019.03.003>.
- Powers, K., & Mandal, A. (2011). Tier III Assessments, Data-Based Decision Making, and Interventions. *Contemporary School Psychology*, 15(1), 21–33. <https://doi.org/10.1007/bf03340960>.
- Rodríguez-Hernández, C. F., Cascallar, E., & Kyndt, E. (2020). Socio-economic status and academic performance in higher education: A systematic review. *Educational Research Review*, 29(February 2020), 100305.1-75. <https://doi.org/10.1016/j.edurev.2019.100305>.
- Scheibenzuber, C., Hofer, S., & Nistor, N. (2021). Designing for fake news literacy training: A problem-based undergraduate online-course. *Computers in Human Behavior*, 121(March), 106796.1-13. <https://doi.org/10.1016/j.chb.2021.106796>.
- Sember, V., Jurak, G., Kovač, M., Morrison, S. A., & Starc, G. (2020). Children's Physical Activity, Academic Performance, and Cognitive Functioning: A Systematic Review and Meta-Analysis. *Frontiers in Public Health*, 8(July), 1-17. <https://doi.org/10.3389/fpubh.2020.00307>.
- Smith, B., & Monforte, J. (2020). Stories, new materialism and pluralism: Understanding, practising and pushing the boundaries of narrative analysis. *Methods in Psychology*, 2(March), 100016.1-8. <https://doi.org/10.1016/j.metip.2020.100016>.
- Subasi, A., Khateeb, K., Brahimi, T., & Sarirete, A. (2019). Human activity recognition using machine learning methods in a smart healthcare environment. In *Innovation in Health Informatics: A Smart Healthcare Primer*. Elsevier Inc. <https://doi.org/10.1016/B978-0-12-819043-2.00005-8>.
- Suparman, Y., & Arifin, N. (2021). Enhancing mathematical problem-solving skills of Indonesian junior high school students through problem-based learning: A systematic review and meta-analysis. *Al-Jabar: Jurnal Pendidikan*, 12(1), 1–16. <https://doi.org/10.24042/ajpm.v12i1.8036>.
- Thomas, J., & Mengel, T. (2008). Preparing project managers to deal with complexity - Advanced project management education. *International Journal of Project Management*, 26(3), 304–315. <https://doi.org/10.1016/j.ijproman.2008.01.001>.
- Valtonen, T., Hoang, N., Sointu, E., Näykki, P., Virtanen, A., Pöysä-Tarhonen, J., & Kukkonen, J. (2021). How pre-service teachers perceive their 21st-century skills and dispositions: A longitudinal perspective. *Computers in Human Behavior*, 116, 106643. <https://doi.org/10.1016/j.chb.2020.106643>.
- Van Oers, B. (2018). Long-Standing and Innovative Programs in Early Childhood Education: An Introduction. In *International Handbook of Early Childhood Education* (pp. 969–993). https://doi.org/10.1007/978-94-024-0927-7_50.
- Vidergor, H. E., & Ben-Amram, P. (2020). Khan academy effectiveness: The case of math secondary students' perceptions. *Computers and Education*, 157(July), 103985.1-12. <https://doi.org/10.1016/j.compedu.2020.103985>.
- Villacís, J. L., Naval, C., & De la Fuente, J. (2022). Character strengths, moral motivation and vocational identity in adolescents and young adults: a scoping review. *Current Psychology*, 2(July 2022), 1–16. <https://doi.org/10.1007/s12144-022-03427-x>.
- Wang, X., Margulies, D. S., Smallwood, J., & Jefferies, E. (2020). A gradient from long-term memory to novel cognition: Transitions through default mode and executive cortex. *NeuroImage*, 220(March), 117074.1-12. <https://doi.org/10.1016/j.neuroimage.2020.117074>.
- Zaid, N. N. M., Rauf, M. F. A., Ahmad, N. A., Zainal, A., Razak, F. H. A., & Shahdan, T. S. T. (2022). Learning elements for digital literacy among elderly: A scoping review. *Journal of Algebraic Statistics*, 13(3), 2850–2859. <https://doi.org/ISSN: 1309-3452>.
- Zhang, H., Gupta, S., Sun, W., & Zou, Y. (2020). How social-media-enabled co-creation between customers and the firm drives business value? The perspective of organizational learning and social Capital. *Information and Management*, 57(3), 103200.1-17. <https://doi.org/10.1016/j.im.2019.103200>.