

Effectiveness of Learning at State Vocational School 4 Takalar

Haerati¹, Risma Niswaty², Nasaruddin Hasyim³

^{1,2,3}Universitas Negeri Makassar

Email: nasarudin.h@unm.ac.id

ABSTRACT

This research is motivated by the importance of learning effectiveness in improving the quality of optimal education, especially in Vocational High Schools (SMK), which emphasize practice-based and skills-based learning. The purpose of this study was to evaluate the effectiveness of learning at SMK Negeri 4 Takalar and to identify the supporting and inhibiting factors. This study used a qualitative approach with data collection through observation, interviews, and documentation. The results showed that the effectiveness of learning at SMK Negeri 4 Takalar was classified as "quite good" based on several indicators, namely the quality of learning, the suitability of the material level, incentives, and time management. The aspect of learning quality can be seen from student activity, while the suitability of the material level is indicated by the teacher's ability to adjust learning to student needs, including through diagnostic assessments. From the incentive aspect, teachers provide additional value to motivate students, while in terms of time, teachers provide flexibility for students in understanding the material. The main supporting factor is the active role of teachers in increasing student involvement, while the inhibiting factor comes from the diversity of student behavior that can interfere with the smoothness of learning. This study is expected to provide insight into improving the effectiveness of learning at SMK.

Keywords: Effectiveness, Learning, Teacher, Vocational Education

INTRODUCTION

Education is a major factor in achieving quality goals. Through education, individuals can improve their abilities and qualities, both as individuals and as members of society. To achieve this development, an educational process is needed which is manifested in the form of learning activities.

Along with progress in the world of education, continuous change and adjustment are needed. Each party involved has an obligation to continue to seek creative and innovative solutions in facing challenges that arise in the classroom, an understanding of existing obstacles and close cooperation are needed. Thus, the learning process can be a valuable, inspiring, and effective experience for each student

Various factors contribute to the low quality of education, one of the challenges in the world of education is the lack of effectiveness in the learning process (Akib et al., 2024; Arhas & Haryoko, 2024; Nasrullah et al., 2024). This factor can come from students, teachers, and supporting facilities. As the main element in education in the school environment, learning activities have a very significant role (Annisa et al., 2025; Arhas & Jamaluddin, 2024; Maulidya et al., 2024; Saleh, Supardi, et al., 2024; Suprianto, 2024). For this reason, the achievement of teaching and learning goals in schools is greatly influenced by the level of excellence of the learning process experienced by students. Teachers, who have a crucial role in teaching, are responsible for creating a learning process that can optimally increase student interest so that students can achieve excellent learning outcomes. Self-study is one of the activities students

undertake to achieve their goals, which are gained through experience and interactions with their surroundings. Basically, the educational process is a process of internal transformation in individuals whose nature cannot be observed.

Learning is a process supported by educators in encouraging students' thinking abilities. The purpose of this stage is to help students strengthen their thinking skills better and hone their skills in building new knowledge, so that students can understand learning materials more optimally.

The learning process is a series of activities that involve collaboration between teachers and Students in the context of learning in order to achieve learning targets (Darwis et al., 2022; Sirait et al., 2019; Tadjer et al., 2022). Mutually beneficial interactions between educators and students are the main elements in the implementation of learning activities. Ideal learning should be able to arouse student enthusiasm so that learning objectives can be achieved more easily. The success of the learning process is influenced by various things, including one of which is the role of educators in designing and implementing learning. This includes determining the right model, approach, strategy, and learning method (Andriani et al., 2024; Nurhawaisyah, 2021; Ramadhani et al., 2024)

Based on Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System Article 1, learning is defined as a process of interaction between students, educators, and various learning resources in the educational environment. This interaction process has a crucial role in conveying information from educators to students to achieve the expected learning goals. In addition, effectiveness refers to a condition that reflects the level of success or achievement of a goal, which is measured through aspects of quality, quantity, and time according to the established plan.

state that learning effectiveness is an important indicator in every educational process. Learning is said to be effective if it is able to achieve the educational goals that have been set. An effective learning process creates a pleasant learning atmosphere and motivates students to learn creatively (Gordillo et al., 2022; Saleh, Septianti, et al., 2024). In addition, this approach also allows students to learn with methods that are in line with their individual learning styles.

Along with the advancement of human knowledge and skills in the modern era, the role of teachers has experienced significant development. The teacher's task is no longer limited to conveying information to students, but also includes the ability to understand the extent to which students can receive and master the material optimally.

The expected effectiveness of learning can be realized by encouraging students to actively participate in the learning process, both in large and small groups. To improve learning outcomes, teachers need to consistently integrate various methods, strategies, media, or learning resources that are effective and enjoyable for students.

In vocational education, as implemented in vocational schools, the effectiveness of learning plays a crucial role because students not only need to understand theoretical concepts but must also be able to apply them practically according to the needs of the world of work. Vocational education makes a significant contribution to producing competent, creative, and competitive human resources in the era of globalization. Therefore, the management of learning in vocational schools must pay attention to aspects of quality, relevance, and sustainability to achieve the desired educational goals.

Learning effectiveness is also influenced by various factors, including the suitability of the curriculum to the needs of the world of work, the ability of teachers to manage classes, and active student participation. In vocational schools, the role of teachers is not only limited to being facilitators, but also as mentors who guide students in mastering skills that are in accordance with industry needs. Therefore, teachers are required to continue to innovate in choosing strategies, methods, and learning media that support the achievement of optimal learning outcomes.

However, in the implementation of learning, various obstacles often arise, such as minimal supporting facilities, variations in student ability levels, and low learning motivation among students. These problems require the right approach and solution so that the learning process can take place effectively and produce maximum achievement for students.

This study is very important to deepen understanding of the effectiveness of learning at SMK Negeri 4 Takalar. By analyzing various factors that support and inhibit the learning process, it is hoped that the results of this study can be a basis for schools and stakeholders to formulate strategies to improve the quality of learning. In addition, it is also hoped that this study can be a reference for other vocational education institutions to improve the effectiveness of learning.

METHOD

This study applies a qualitative approach with a descriptive method to gain a deeper understanding of the effectiveness of learning. Data were collected through observation, interviews, and documentation to analyze various relevant aspects related to the research object. The research stages began with pre-field preparation, which included planning, location selection, initial observation, and preparation of research tools. A preliminary study was conducted to gain an initial understanding of the research subject before proceeding to the next stage.

At the field stage, data were obtained through interviews with informants and direct observation of learning activities. The focus of the study included the quality of learning, the suitability of learning levels, incentives, time, and various factors that support or hinder the effectiveness of learning. The collected data were then analyzed systematically in the final stage to produce relevant and accountable conclusions.

The validity of the data was guaranteed through validation using the triangulation method, which included source triangulation and technique triangulation. Source triangulation was carried out by repeating questions to informants, while technique triangulation combined interviews, observations, and documentation. This validation aims to ensure that the data obtained is accurate, consistent, and able to provide an accurate picture of the effectiveness of learning.

RESULT AND DISCUSSION

This study involved five informants, consisting of three teachers and two students majoring in Office Management Automation at SMK Negeri 4 Takalar. Informants were selected to provide valid and accurate information regarding the effectiveness of learning, by ensuring their ability to answer questions during interviews. The results of the study are presented descriptively using indicators proposed by (Hafeez et al., 2022; Jiménez-Bucarey, 2021; Niku, 2023; Nusairat et al., 2023) "quality of learning, suitability of learning level, incentives, and time." The following is a description of the results of the data analysis obtained during the research process:

Quality of Learning

The quality of education can be seen from how involved students are in the learning process and how well they are able to explain the material that has been taught previously. This reduces the quality of education as a business that is run effectively according to procedures to achieve the desired goals.

The results of the interview showed that the quality of learning is reflected in the effectiveness and activeness of students during the learning process. Student activeness is

influenced by the teacher's ability to understand the needs, complaints, and desires of students. Adequate facilities also play an important role in supporting the success of learning and achieving the expected goals.

Table 1: Facilities of OTKP Department

Research Indicators	Observation results		
	Name of Object	Amount	Condition
Office machines and equipment	Printer	1	Good
	LCD	1	Good
	Mobile phone	2	Damaged
	Computer	6	Good
	Box file	8	Good
	Bantex	15	Good
	Perforator	15	Good
	Bone Map	30	Good
	Paper clip	150	Good
	Whiteboard	3	Good
Learning Media	Fan	3	Good

Based on the results of the observation, it can be seen that the facilities in the OTKP department are in a damaged condition some are still lacking, such as only two mobile phones and only six computers, so that the number of students is inadequate, so students bring their own laptops when office practice is to be carried out so that the teaching process runs well.

Learning quality refers to the educational standards set to achieve the goals that have been designed. This is important because it reflects the level of student participation in the learning process and their ability to explain previously learned material.

Based on research on the effectiveness of learning at SMK Negeri 4 Takalar, effectiveness is defined as the ability to achieve desired results or outputs. Effectiveness functions as an indicator to assess the extent to which an organization or group has succeeded in achieving its stated goals. In the context of learning, effectiveness refers to the extent to which the interaction process in learning is successful, which can be seen from student responses and how they utilize available resources to achieve learning goals effectively and efficiently.

Based on this theory, improving the quality of education is very important to achieve the stated learning goals. Students who are actively involved in the educational process usually have better physical and emotional well-being, which allows them to absorb various learning experiences that will support their understanding and learning outcomes. The better the quality of education, the higher the number of minimum learning outcomes or goals that can be achieved.

Learning Level Suitability

The appropriate level of learning refers to the extent to which the learning process is tailored to the student's ability to understand new material. This can be measured through the student's individual learning style and the extent to which they understand the material presented. Students who have not achieved learning objectives can receive guidance from the teacher to help them achieve the desired learning outcomes. Based on the available information, the effectiveness of the education process can be evaluated through the skill mastery stage. At this stage, the teacher must choose teaching methods and models that are

in accordance with the curriculum being implemented, as well as utilize appropriate learning facilities and media so that the curriculum objectives can be achieved as desired.

The suitability of the learning level refers to the extent to which the material taught matches the student's ability to receive information. This is important to know how well the learning matches the student's ability to master new information. The student's readiness to learn and their understanding of the material presented are key factors in determining the extent to which the learning matches their abilities.

Based on the study's results, there was a suitable learning level, where the teacher was able to adjust the material to the students' abilities to learn. In addition, the teacher conducted a diagnostic assessment to understand the character of the student and adjust the material to the student's needs during the learning process. The students' abilities were also seen when they responded to questions from the teacher.

Learning is a process in which students actively construct their own knowledge (Adipat et al., 2021; González Hernández, 2023; Guardia et al., 2019). Students no longer passively receive knowledge about facts through one-way schooling by the teacher but are expected to be able to understand the material based on their own experiences and interactions with the surrounding environment.

Based on this theory, the suitability of the learning level is assessed at this stage by evaluating the student's abilities, then adjusting the type of learning to ensure that students are ready to participate in the learning and teaching process. The implementation of effective learning reflects the suitability of the learning level, allowing teachers to choose the correct learning methods and models and utilize appropriate materials.

Intensive

Incentives are a form of encouragement or stimulation given by teachers to increase students' learning motivation, encourage discipline, and ensure active involvement in completing tasks. This motivation can have a positive impact on students' learning outcomes, enabling them to achieve their learning objectives optimally.

The results of interviews with informants revealed that offering gifts or rewards during the learning process serves as an additional encouragement, motivating students to learn. Awarding this reward is related to the achievement of learning goals and can impact the enthusiasm of both teachers and students during the learning process.

Interviews also showed that students' learning motivation can not only be fostered through giving gifts or rewards by teachers, but also by instilling the principle that learning is not only limited to activities in the classroom but can also be done in a place that supports student comfort.

The incentive in question is a form of motivation or encouragement given by teachers to students to increase their enthusiasm for learning, as well as help students become more disciplined and responsible for the tasks given. This can affect student learning outcomes and support the achievement of learning objectives. Therefore, it is essential to assess the level of student motivation and encouragement during the learning process.

The study's results showed that teachers awarded students, such as points or additional grades, for their active participation in the learning process. One way to attract students' interest and motivate them to learn is to offer gifts or rewards. Giving gifts or rewards is related to the achievement of learning, which can increase enthusiasm for both teachers and students in learning. Students will find it difficult to achieve maximum achievement without high motivation. In addition, teachers also play a role in increasing student learning motivation, such as by giving numbers, praise, gifts, group work, competition, goals, inspiration, sarcasm, assessments, field trips, educational films, and learning through radio. (Koh, 2020; Marini et al., 2019; Tan, 2021; Zaitseva & Goncharova, 2022).

Based on this theory, incentives in learning are one method to increase student motivation. Rewards are intended to reinforce student behavior. However, rewards must be given in the right way so as not to transform into rewards or payments, which can reduce motivation. In addition, rewards must be administered carefully to avoid social jealousy among students.

Time

Time provides students with an opportunity to understand the material being taught. It is hoped that students will make the best use of the available time so that the set learning objectives can be achieved.

Based on the results of interviews with teachers of the Office Management Automation department, it can be understood that giving students time can provide them with the opportunity to capture material that is not well understood. A teacher needs to allocate time so that certain materials can be delivered effectively by the objectives set in the learning material.

Based on the results of the interview, students can have the time or energy to review the material that has been given during full class hours. When students are given their own time or have free time, they can review the material that has been discussed until the learning process in class.

Based on research on the effectiveness of learning at SMK Negeri 4 Takalar, effectiveness is defined as the ability to achieve desired results or outputs. Effectiveness serves as an indicator to measure the level of success an organization or group achieves in meeting its predetermined goals. In the context of learning, effectiveness refers to the extent to which the learning interaction process is successful, as indicated by student responses and their effective and efficient utilization of existing resources to achieve learning goals. Learning effectiveness is a teaching and learning process that is carried out well, where students are disciplined and can maintain personal and social harmony at school. Learning effectiveness is related to quality activities in planning, implementing, and evaluating carried out by teachers, which are the benchmark for teacher success in the classroom. Learning effectiveness is achieved by involving students in grouping and finding information, so that the activeness of students in learning can affect their learning success." (Aldalur & Perez, 2023; Alp Christ et al., 2022; Mathur et al., 2024), Based on the theory, it can be concluded that the effectiveness of education at SMK Negeri 4 Takalar is the primary goal that must be achieved to improve the learning process, ensuring it runs effectively and efficiently to meet educational objectives. Therefore, relevant indicators for measuring the effectiveness of education include the quality of learning, alignment of learning goals, level of motivation, and time management.

The allocated time aims to provide students with opportunities to understand the material presented. It is hoped that students can use this time well to achieve the learning objectives that have been set. This is crucial for evaluating the extent to which students understand the material within a limited timeframe, as well as assessing the thought process they employ to achieve the desired results. Based on the study's results, it is evident that teachers allocate sufficient time for students to understand the material, ask questions, and review it if necessary. This provision of time is essential because each student has different abilities in understanding the material. By providing additional time, students can study material that they do not yet understand. A teacher needs to ensure that there is sufficient time to deliver certain materials effectively, in accordance with the expected learning objectives. The role of time management is significant in learning activities, because time management is an internal factor that influences learning. Good time management can be a motivator for individuals to learn, so that they are more enthusiastic and do not get bored easily with the material, which will ultimately improve learning outcomes." Based on this

theory, giving time in learning is a step that offers students the opportunity to ask questions related to things that are difficult to understand and understand the material that has been taught. Time management has a crucial role in the success of student learning. Students who are unable to manage time often show signs of irregular planning, inconsistency, without clear goals, and a lack of discipline in using their time. Based on the results of data analysis and discussion regarding the use of interactive learning media for students in the MPLB department of UPT SMK Negeri 1 Bulukumba, it can be concluded that the use of interactive learning media is in the less-than-optimal category. This can be seen from several indicators. In terms of effectiveness, the use of learning media is classified as effective in helping students' understanding, especially with the use of LCDs and visual displays. Efficiency is also classified as good because of the readiness of teachers in preparing simple media that support the learning process to run on time. However, in terms of diversity, the learning media used is still not very varied. Although the school provides devices such as projectors and computers, their use is not optimal and is still dominated by traditional media such as printed books, so that it does not encourage student creativity and involvement. In addition, in terms of interactivity, the learning process is still less interactive due to the use of monotonous media and minimal use of interactive technology. Traditional media tends to produce one-way communication, which has an impact on low active student participation. Supporting factors for the use of interactive learning media include the suitability of the media to the learning material, active student involvement, ease of use of the media, teacher readiness, and teacher creativity in overcoming obstacles. However, there are several significant inhibiting factors, such as limited technological infrastructure, lack of teacher training in the use of technology, and limited devices that must be used alternately. Technical constraints such as unstable electricity and internet are also challenges.

CONCLUSION

SMK Negeri 4 Takalar, especially the Office Management Automation major, has a "fairly good" learning quality. The following indicators show this: 1) Learning Quality: the main indicator of good education quality is student activeness in the learning process. It is very important for teachers to encourage their students to participate in facilitation activities. 2) Appropriateness of Learning Level: Teachers can understand students' abilities in handling the material and conduct diagnostic evaluations to identify student characteristics that are appropriate for the delivery of the material. 3) Incentives: Teachers give awards, such as points or additional grades, to students who are active in the lesson. 4) Time: Teachers give students time to understand the material, ask questions, or repeat material that has not been learned.

REFERENCES

- Adipat, S., Laksana, K., Busayanon, K., Ausawasowan, A., & Adipat, B. (2021). Engaging Students in the Learning Process with Game-Based Learning: The Fundamental Concepts. *International Journal of Technology in Education*, 4(3). <https://doi.org/10.46328/ijte.169>
- Akib, H., Niswaty, R., Saleh, S., Arhas, S. H., Darwis, Muh., Nasrullah, Muh., Jamaluddin, J., Salam, R., Isgunandar, I., Hasyim, N., & Nasir, N. (2024). Memahami Pembelajaran dengan Lebih Mendalam. In S. Suprianto (Ed.), *ASHA Publishing*. ASHA Publishing. <https://doi.org/10.63164/590717>
- Aldalur, I., & Perez, A. (2023). Gamification and discovery learning: Motivating and involving students in the learning process. *Heliyon*, 9(1). <https://doi.org/10.1016/j.heliyon.2023.e13135>

- Alp Christ, A., Capon-Sieber, V., Grob, U., & Praetorius, A. K. (2022). Learning processes and their mediating role between teaching quality and student achievement: A systematic review. In *Studies in Educational Evaluation* (Vol. 75). <https://doi.org/10.1016/j.stueduc.2022.101209>
- Andriani, A., Akib, H., & Nasir, N. (2024). The Influence of the Application of the Demonstration Method on Student Learning Achievement on the Document Storage System Material of the OTKP Department at SMK Negeri 1 Makassar. *Journal of Educational Development and Learning (JEDAL)*, 1(2), 77–87. <https://doi.org/10.70188/e6bwgt47>
- Annisa, A., Nasrullah, Muh., & Arhas, S. H. (2025). The Influence of Learning Discipline on the Learning Achievement of Class X Students of Office Management and Business Services. *International Journal of Administration and Education (IJAE)*, 2(1), 10–17. <https://doi.org/10.70188/a4wbgy33>
- Arhas, S. H., & Haryoko, S. (2024). Strategi Penjaminan Mutu Perguruan Tinggi. In N. Hasyim & H. Haerul (Eds.), *ASHA Publishing*. ASHA Publishing. <https://doi.org/10.63164/590723>
- Arhas, S. H., & Jamaluddin, J. (2024). Analysis of Educational Facilities and Infrastructure Management. *Pinisi Journal of Education and Management*, 102–110.
- Darwis, M., Husain, M., Jamaluddin, J., & Syaekhu, A. (2022). Comparison of Learning Areas Between Offline and Online Learning in the Office Administration Education Study Program, UNM. *Pinisi Journal of Education and Management*, 1(1), 1–12.
- González Hernández, W. (2023). The Teaching-Learning Process or the Teaching Process and the Learning Process. *Culture and Psychology*, 29(1). <https://doi.org/10.1177/1354067X221097610>
- Gordillo, A., Lopez-Fernandez, D., & Tovar, E. (2022). Comparing the Effectiveness of Video-Based Learning and Game-Based Learning Using Teacher-Authored Video Games for Online Software Engineering Education. *IEEE Transactions on Education*, 65(4). <https://doi.org/10.1109/TE.2022.3142688>
- Guardia, J. J., Del Olmo, J. L., Roa, I., & Berlanga, V. (2019). Innovation in the teaching-learning process: the case of Kahoot! *On the Horizon*, 27(1). <https://doi.org/10.1108/OTH-11-2018-0035>
- Hafeez, M., Naureen, S., & Sultan, S. (2022). Quality Indicators and Models for Online Learning Quality Assurance in Higher Education. *Electronic Journal of E-Learning*, 20(4). <https://doi.org/10.34190/ejel.20.4.2553>
- Jiménez-Bucarey, C. (2021). Student's satisfaction of the quality of online learning in higher education: An empirical study. *Sustainability (Switzerland)*, 13(21). <https://doi.org/10.3390/su132111960>
- Koh, J. H. L. (2020). Perceptions of learning management system quality, satisfaction, and usage: Differences among students of the arts. *Australasian Journal of Educational Technology*, 36(3), 26–40. <https://doi.org/10.14742/AJET.5187>
- Marini, A., Maksum, A., Satibi, O., Edwita, Yarmi, G., & Muda, I. (2019). Model of student character based on character building in teaching learning process. *Universal Journal of Educational Research*, 7(10). <https://doi.org/10.13189/ujer.2019.071006>
- Mathur, G., Nathani, N., Chauhan, A. S., Kushwah, S. V., & Quttainah, M. A. (2024). Students' Satisfaction and Learning: Assessment of Teaching-Learning Process in Knowledge

- Organization. *Indian Journal of Information Sources and Services*, 14(1), 1-8. <https://doi.org/10.51983/ijiss-2024.14.1.3798>
- Maulidya, N., Akib, H., & Arhas, S. H. (2024). The Influence of the Application of the Discussion Learning Method on Students' Learning Interest at SMK Negeri 1 Pangkep. *International Journal of Administration and Education (IJAE)*, 1(4), 149-157. <https://doi.org/10.70188/ha9hcb59>
- Nasrullah, M., Sari, A. N. I., Isgunandar, I., & Arhas, S. H. (2024). The Influence of Service Quality and Teacher Performance on Student Satisfaction in Administrative Perspective. *Jurnal Office: Jurnal Pemikiran Ilmiah Dan Pendidikan Administrasi Perkantoran*, 58-68.
- Niku, E. M. (2023). Quality management of distance learning higher education. In *International Journal of Social Science and Human ijsshr.in*. <https://www.ijsshr.in/v6i3/Doc/72.pdf>
- Nurhawaisyah, N. (2021). Learning with the Mosiulika Mosijagai Method at SMKN 2 Palu, Post-Earthquake in Central Sulawesi. *Jurnal Ad'ministrare*, 8(1), 87-96.
- Nusairat, N. M., Dalbah, L. S., Hammouri, Q., Al-Gasawneh, J. A., Abed AlHakim Akhuirshaideh, D., Alnasser, T. Z., & Mohamed Anuar, M. (2023). Student e-Learning Experience: A Nexus among e-Learning Quality, Student Engagement and Resulting Satisfaction. 2023 *International Conference on Business Analytics for Technology and Security (ICBATS)*, 1-5. <https://doi.org/10.1109/ICBATS57792.2023.10111129>
- Ramadhani, A., Hasyim, N., & Jamaluddin. (2024). Effectiveness of Using Demonstration Learning Method for Grade X Students in Archiving Subject at SMK Nurul Qalam Makassar. *Journal of Educational Development and Learning (JEDAL)*, 1(1), 27-33. <https://doi.org/10.70188/6q27k944>
- Saleh, S., Septianti, D., & Darwis, Muh. (2024). Effectiveness of the Utilization of SIMDIKLAT Application in Education and Training Activities. *Journal of Educational Development and Learning (JEDAL)*, 1(2), 41-49. <https://doi.org/10.70188/cayx6y29>
- Saleh, S., Supardi, E., & Arhas, S. H. (2024). The Influence of PowerPoint Learning Media on the Learning Interest of SMK Saribuana Makassar Students. *Pinisi Journal of Education and Management*, 170-179.
- Sirait, E. J. M., Arhas, S. H., & Suprianto, S. (2019). The Influence of Assignment of Lecturers at School (ALS) Program on Students Learning Motivation in Tarakan City. *Jurnal Ad'ministrare*, 6(1), 79-88.
- Suprianto, S. (2024). Education, Regulation, and Public Administration. *International Journal of Administration and Education (IJAE)*, 1(3), 141-148. <https://doi.org/10.70188/vayc8r80>
- Tadger, H., Lafifi, Y., Seridi-Bouchelaghem, H., & Gülseçen, S. (2022). Improving soft skills based on students' traces in problem-based learning environments. *Interactive Learning Environments*, 30(10). <https://doi.org/10.1080/10494820.2020.1753215>
- Tan, K. H. (2021). Higher education students' online instruction perceptions: A quality virtual learning environment. In *Sustainability (Switzerland)* (Vol. 13, Issue 19). <https://doi.org/10.3390/su131910840>
- Zaitseva, E. V., & Goncharova, N. V. (2022). Assessment of student satisfaction with technology and organization of the learning process at the university. ... *Conference on Professional Culture of the* https://doi.org/10.1007/978-3-031-26783-3_31

