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Impact of Student Factors on Hybrid Learning Performance Across Educational Levels: An Empirical Study"

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A B S T R A C T

COVID-19 has brought many changes in all aspects of our lives, especially in education. We shifted from traditional face-to-face learning to online learning and finally to hybrid learning. With the combination of face-to-face learning and online learning, hybrid learning acts as the best solution to accommodate the best teaching-learning activities. This study investigates the effects of students' motivation to learn, social interaction, teacher-student communication and technology readiness of Junior and Senior High students during the hybrid learning. This study was conducted using a quantitative method by analyzing the data collected from an online questionnaire distributed to 403 respondents. The analysis model used in this research is structural equation modeling (SEM-PLS) with data processing tools with Smart PLS 4. The results showed that there was a positive and significant effect between students' motivation to learn, social interaction, teacher-student communication and technology readiness towards learning performance during hybrid learning. As for the results of the moderating effect of level of education, there was no significant difference between students' motivation to learn and technology readiness towards learning performance between Junior High and Senior High students, but there was a significant difference between social interaction and teacher-student communication towards learning performance between Junior High and Senior High students. Further research should be conducted to investigate the impact of these variables on learning performance using different methods such as PLS-MGA, qualitative methods.

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INTRODUCTION

The COVID-19 pandemic has triggered a significant transformation in education, compelling schools to shift to digital platforms. The reliance on electronic devices and internet connectivity has become crucial in the teaching and learning process. Initially, schools introduced "full online learning" to curb the spread of COVID-19, leading to challenges such as limited device access (Sari, 2021) and student engagement issues (Widiastuti, 2023). Subsequently, hybrid learning emerged as a blend of traditional and online teaching methods, allowing students to participate in both in-person and virtual classes.

Hybrid learning in Indonesia was formalized through a Joint Decree by four ministers, emphasizing a mix of classroom experiences and online courses. Various online platforms like Google Classroom and Zoom facilitated this transition. However, challenges arose during the return to face-to-face learning, with students struggling to readjust socially and academically after prolonged online education (Widiastuti, 2023).

Research highlighted issues faced by students during hybrid learning, including reduced motivation, lack of engagement, and communication barriers between online and in-person students. These challenges underscored the importance of addressing students' motivation to learn, social interaction, teacher-student communication, and technology readiness across different educational levels.

Studies have shown that hybrid learning can enhance students' self-regulation, motivation, interaction, and higher-order thinking skills. However, gaps exist in understanding the combined effects of psychological and behavioral aspects on student performance in hybrid learning environments. Further research is needed to explore these dynamics comprehensively.

The study aims to bridge these gaps by investigating the impact of students' motivation, social interaction, teacher-student communication, and technology readiness on learning performance across various education levels within the context of hybrid learning in Indonesia. Addressing these issues is crucial for optimizing educational outcomes in the evolving landscape of digital education.

LITERATURE REVIEW

This study delves into the effectiveness of hybrid learning by examining students' motivation to learn, social interaction, teacher-student communication, and technology readiness in relation to their academic performance. The selected components are crucial for the success of hybrid learning and were observed at a junior high school in Banten, Indonesia. The study explores various learning methods, learning characteristics of junior and senior high school students, and the concept of hybrid learning.

Learning Method

Learning methods play a vital role in enhancing students' comprehension, engagement, and memory retention. Various teaching strategies include experiential learning, student-centered learning, guided instruction, cooperative learning strategies, project-based learning, and the Montessori Method. Effective instructional strategies such as dispersed practice,

relational learning, and self-testing have been shown to boost student achievement across different contexts (Dunlosky et al., 2013).

Learning Characteristics of Junior High Students

Junior high school students in Indonesia exhibit characteristics such as curiosity, eagerness to learn, preference for collaborative tasks, need for physical activity, and a desire for supportive guidance from adults. Understanding these traits is essential for creating engaging and effective learning environments for junior high school students (Pennington Publishing, n.d.).

Learning Characteristics of Senior High Students

Senior high school students in Indonesia undergo a period of transition from adolescence to young adulthood. They seek purposeful and relevant learning experiences that connect with real-world applications. These students develop a sense of agency, autonomy, and responsibility as they explore adult roles and strive for independence (El Education, n.d.).

Hybrid Learning

According to Patten (2023), hybrid learning combines online and in-person instruction to provide flexible and inclusive learning experiences. It blends the best aspects of traditional classroom teaching with modern digital technologies. The success of hybrid learning lies in its ability to offer flexibility, customization, and engagement to students.

Students' Motivation to Learn

Motivation is a key driver of student engagement and academic performance. Self-Determination Theory (SDT) emphasizes autonomy, competence, and relatedness as fundamental psychological needs that influence intrinsic motivation (Ryan & Deci, 2000). Teachers can enhance students' motivation by providing opportunities for choice, skill-building, and creating supportive social environments.

Social Interaction

Social interaction is defined as any process involving mutual stimulation or response between two or more individuals. Robert Bales' Social Interaction System (2017) is used to improve social contact between students and instructors during hybrid learning. The system emphasizes the significance of both task-oriented and socio-emotional behaviors in successful communication. Teachers can use Bales' classifications of task-oriented and socio-emotional behaviors to create communication plans that strike an equilibrium between the two. In addition, teachers can establish a positive online atmosphere to promote open communication and a feeling of community among all students. All things considered, Bales' Social Interaction System offers a helpful paradigm for comprehending how to support efficient communication and social interaction in the hybrid learning setting.

Teacher-Student Communication

Instructional communication between teachers and students is crucial for meaningful learning experiences. Effective communication fosters positive relationships and enhances the teaching-learning process. The relational approach to instructional communication focuses on emotional reactions and perceptions between teachers and students, influencing motivation levels on both ends. These theoretical frameworks provide valuable insights into understanding the dynamics of hybrid learning environments and optimizing educational outcomes for students across different educational levels.

Technology Readiness

Students' technological readiness in the context of hybrid learning refers to their capacity to use technology to engage in both online and offline learning activities. According to Geng & Niu (2019), students who are more technologically capable have a favorable attitude toward advanced technology communication tools and learning material. It may take students longer to master the usage of online learning platforms if they feel uneasy or insecure about embracing new technology.

Positivity toward educational technology and cutting-edge teaching resources are indicators of high technological readiness in the classroom (Geng et al., 2019d). The tendency of students to accept new technologies in order to meet learning objectives is referred to as their technological readiness (Parasuraman, 2000). E-learning readiness research indicates that students' effectiveness in e-learning can be influenced by their degree of preparedness (Moftakhari, 2013; Piskurich, 2003).

The Education and Technology preparation Index (ETRI) is a multi-dimensional, user-friendly, and free worldwide tool developed to assist countries in measuring their preparation for educational technology. It has been tested across three continents at the same time, thanks to a collaboration between the World Bank's Education Global Practice and the ETRI. The ETRI framework is based on EdTech practices and policies, with six broad pillars: School Management, Teachers, Students, Devices, Connectivity, and Digital Education Resources. It is designed to guide choices and indicate where and how schools might use digital technologies to improve learning opportunities and eliminate inequities.

Students' Learning Performance

According to McBeath (1992), performance indicators are a technique for focusing on specific program needs. They facilitate curriculum delivery strategies and evaluation techniques. A critical first step must be completed before designing performance indicators: agreeing on student outcomes. These are frequently stated to students in the program description, and they are articulated in language that informs students about the program's overall goal as well as the teacher's expectations. The primary difference between student outcomes and performance indicators is that student outcomes are not measurable and are intended to provide general information about the focus of student learning, whereas performance indicators are concrete measurable performances that students must meet as indicators of achievement.

Performance indicators define the specific actions that a student should be able to do as a result of program participation. Following the determination of program objectives, the knowledge and skills necessary for mastery of these outcomes should be specified. This permits students' intended behavior to be expressed and reduces doubt about demonstrating needed competencies. Performance indicators have at least two primary components: the action verb and the content (referent). The targeted behavior must be identified by naming it with an observable action verb such as exhibit, interpret, identify, or define.

Research has been conducted to investigate how students' learning performance and achievement are affected by online versus in-person learning. Paechter and Maier (2010) found that students' self-regulation, collaboration, and self-assessment of their own learning progress, in addition to conceptual knowledge, are important skills that need to be acquired in order to improve their abilities. The study also found that students reported that the benefits of online learning improved their self-regulation skills but did not help them acquire competencies such as subject knowledge and skills, applying their knowledge, and communication and cooperation. However, there was no statistically significant difference in grades between online and traditional learning, indicating that online learning can be just as successful as traditional learning when it comes to student achievement. Other studies have found that combining traditional course delivery with online learning improves the learning experience and performance (Stacey & Gerbic, 2007).

METHODOLOGY

Research Paradigm

This study used a quantitative research paradigm to investigate the effects of students' motivation to learn, social interaction, teacher-student communication, and technology readiness on learning performance during hybrid learning. The study also aimed to investigate the moderating effect of level of education on the relationship between these variables and learning performance.

Population and Sample

The population of this study was Junior and Senior High students who were enrolled in a hybrid learning program. The sample size was 403 respondents who were selected using a purposive sampling method.

Operationalization of Variables

The variables in this study were operationalized using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The variables were:

Students' motivation to learn with 5 indicators adapted from the previous study (Ryan & Deci, 2000). Social interaction: with 8 indicators adapted from the previous study (Bales, 2017). Teacher-student communication: with 4 indicators adapted from the previous study (Hurt, Scott and McCroskey, 1978). Technology readiness: with 5 indicators adapted from the previous study (ETRI, n.d.). Learning performance: This variable was measured with 6

indicators adapted from the previous study (Gronlund, N.E., 1981, McBeath, 1992)

Data Collection

The data for this study were collected using an online questionnaire distributed to the respondents. The questionnaire consisted of items related to the operationalization of variables and demographic information such as age, gender, and school location.

Data Analysis Technique

The data collected were analyzed using structural equation modeling (SEM-PLS) with data processing tools with SmartPLS 4.

RESEARCH RESULT

Characteristics of the Respondents

The characteristics of the respondents were analyzed based on different factors such as age group, levels of education, gender, and school location. The distribution of respondents in each category is summarized in the following tables:

Table 1. Characteristics of the Respondents

Variable	Mean	Standard Deviation	Min	Max	Description
Motivation to Learn	4.2	0.6	3.0	5.0	Neutral
Social Interaction	4.5	0.4	4.0	5.0	Agree
Teacher-Student Communication	4.3	0.5	3.5	5.0	Agree
Technology Readines	4.1	0.7	2.5	5.0	Strongly agree

Variable	Mean	Standard Deviation	Min	Max	Description
s					
Learning Performance	3.8	0.8	2.0	4.5	Agree

After determining the reliability and validity of the pre-test, the research moved on to the main test stage. This study makes use of data from 403 respondents who meet the requirements. SMART PLS 4 tools were used to process data using the PLS-SEM approach.

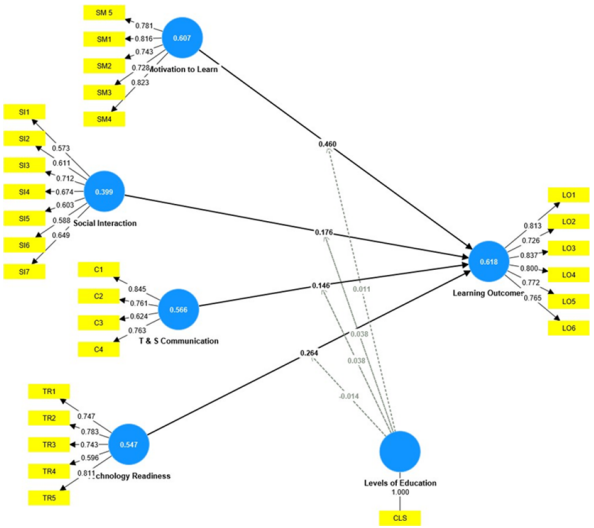

Figure 1. PLS-SEM approach

Based on the The Fornell Lackert Discriminant Analysis, learning performance has the strongest correlation coefficient with the figure 0.786. and the Social Interaction with the lowest correlation value 0.632 is the number. The outcome also highlighted the fact that each variable in the model has discriminating validity.

Based on the Cronbach Alpha and Composite Reliability results, it can be concluded that all variables were reliable.The analysis is made up of three types of variables: intervention or mediation variables, dependent variables or endogenous variables, and independent variables or exogenous variables.

R square and f square

Learning performances' R-squared value is 0.635, indicating that 63.5% of the variance in the dependent variable can be explained by the independent variable(s) in the model, while the other 36.5% can be influenced by other variables outside this research. These values are all less than 0.02, indicating small effect sizes of the variables toward the learning performance. With the result of hypothesis test, it means the effects of motivation to learn, social interaction, teacher-student communication, and technology readiness toward learning performance are significant and positive.

The slope analysis results for the moderating effect are shown to evaluate the impact of the moderating variable. To enrich the data result, analysis of separate categories (JHS and SHS) was conducted using bootstrapping to identify the path coefficient results (p value result) of both categories.

DISCUSSION

Students' motivation to learn affects positively to students' learning performance in hybrid learning

The study reveals a strong correlation between motivation to learn and learning performances. The research supports online interviews conducted by Istijanto (2022) and suggests that high school students with good motivation to learn maximize their learning by attending classes, listening to teachers, and submitting assignments on time.

Students' social interaction affects positively to students' performance in hybrid learning

The study confirms the hypothesis that social interaction positively impacts students' performance in hybrid learning. However, the f-square analysis results show a small effect. This supports research by Kintu et al. (2017), which found that technology, resources, and high interaction lead to highly motivated learners.

Teacher-students' communication affects positively to students' performance in hybrid learning

The study confirms the hypothesis that teacher-student communication influences student performance in hybrid learning. This finding supports Sun et al.'s (2022) study, which found that two-way communication between teachers and students improves learning effects, psychological climate, and engagement, highlighting the importance of effective communication.

Technology readiness affects positively to students' learning performance in hybrid learning

The hypothesis that "technology readiness affects positively to students' performance in hybrid learning" is supported by statistical analysis, which produced a significant result with a p-value of 0.000. The results aligned with the study conducted by Geng et al. (2019).

Profile comparison between JHS and SHS

Adolescence, marked by significant body, academic, and social changes, may impact learning performance differently among junior high school (JHS) and senior high school (SHS) students due to differences in motivation, social interaction, and technological readiness.

The impact of the motivation to learn towards the learning performance between JH students and SH students

The study found that motivation to learn is equally significant for both JH and SH students in improving learning performance during hybrid learning. This confirms previous studies indicating that increasing motivation leads to better academic performance. However, the study does not specify the effects on JH and/or SH students, suggesting further research is needed to determine the specific influence of motivation on learning performance.

The impact of the social interaction towards the learning performance between JH students and SH students

The study reveals that social interaction significantly impacts the learning performance of JH and SH students. JH students outperform SH students in school when they engage in greater social interaction, while SH students score less. The results contradict a study by Labonte & Smith (2022), which found reduced engagement in collaborative activities with peers when learning using technology. The study suggests that age and education levels may influence students' learning experiences and outcomes, but further research is needed to draw more specific conclusions.

The impact of teacher-student communication towards the learning performance between JH students and SH students

The study reveals that teacher-student communication significantly impacts learning performance in Junior High (JH) students, but not in Senior High (SH) students. The red line shows a flat impact, while the green line shows a sharp upward slope. However, there is no specific literature on the impact of teacher-student communication on learning performance in JH or SH students, and further research is needed to confirm or contradict the findings.

The impact of the technology readiness towards the learning performance between JH students and SH students

The graph shows that JH and SH students' learning performance is positively impacted by their levels of technology readiness. More research is needed to confirm if education levels have moderating effects on the relationship between technological readiness and learning performance.

CONCLUSIONS AND RECOMMENDATIONS

The results showed that students' motivation to learn, social interaction, teacher-student communication and technology readiness positively affect students' learning performance in hybrid learning with their indicators.

The study found no significant differences in the impacts of motivation to learn and technology readiness toward learning performance between levels of education (JH-SH), suggesting that the effect of these variables on learning performance is consistent across different levels of education. The levels of education did not moderate the effects of these variables on learning performance.

In this study, however, there were varied effects of social interaction and teacher-student communication on learning performance across educational levels (JH-SH) during hybrid learning. It indicates that the impact of these factors on learning performance are not steady across educational levels. Puberty, student emotional needs for social engagement, and a sense of connectivity can all have an impact on these. To find a solution, further study is needed.

ADVANCED RESEARCH

The research focused on hybrid learning, which was experienced by respondents a half a year before the questionnaire was distributed, which may have caused difficulties in answering accurately. The questionnaire statements were written from a general and theoretical perspective, which could cause difficulties for unfamiliar respondents. Further research should focus on current events using relevant tools.

Further research should explore the reasons behind the neutral attitude towards social interaction and teacher-student communication indicators, and investigate the impact of technology readiness on learning performance. Additionally, further investigation into the moderating effect of education levels on students' performance in hybrid learning using PLS-MGA would be beneficial.

This study also has some limitations that are identified, such as the respondents are demographically around Tangerang and Bekasi area, further research can expand it to wider areas. This study used a quantitative method to analyze the data, a qualitative method and/or mixed methods can be conducted to enrich the academic findings.

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