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Empowering Minds: A Holistic Approach To Literacy, Numeration, And Technological Adaptability For Innovative Differentiation And Agility
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EMPOWERING MINDS: A HOLISTIC APPROACH TO LITERACY, NUMERATION, AND TECHNOLOGICAL ADAPTABILITY FOR INNOVATIVE DIFFERENTIATION AND AGILITY

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ABSTRACT

The objective of this study is to examine the impact of literacy, numeracy and technological adaptation on students' agility and competency absorption capacity with differentiated learning innovation as an intervening variable in Surabaya, East Java Province, Indonesia. The study was conducted in Surabaya City, in six sub-districts. The study's sample consisted of 125 respondents. The data obtained from the surveys was further analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). Additionally, literacy has a positive and significant effect on the agility of students' ability to absorb competencies, while government numeracy has a positive and significant effect on the agility of students' competency absorption capacity; Technology Adaptability directly has a positive and significant effect on the agility of competency absorption capacity; Differentiated learning innovation directly has a positive and significant effect on competency absorption capacity. Differentiated learning innovation is able to partially mediate literacy, numeracy and technological adaptability on the agility of competency absorption capacity in Serang City, Banten Province. The research findings and data analysis indicate that literacy, numeracy, and technology adaptability have a direct and significant impact on differentiated learning innovation.

***Keywords*:** literacy, numeration, technology adaptability, learning innovation, competency

1. INTRODUCTION

Education plays a big role in advancing a nation (Sun et al., 2022), Since the era of the struggle for independence, it has been recognized by freedom fighters and pioneers of independence that education is a crucial part in their endeavors to educate the nation's life and can also free them from the shackles of colonialism (Moy et al., 2016). Therefore, they argue that apart from being a political institution (Latuconsina, 2023), in the struggle to face the colonialists in seeking independence, this must be done through education. Education so that the learning process provided can always be sufficient to attract student interest (Green & Huntington, 2017), it is not uncommon for children to have the opinion that the lessons given by the teacher do not provide significant benefits (Boyatzis et al., 2017).

The teacher's task is not only to provide teaching which is currently outside of these rules (Pharmacy et al., 2013). Teachers must be able to provide learning, namely directing students to become mature and responsible human beings so that all aspects of the human self can continue to develop (Zainuddin et al., 2020). A direct effect that can be received from the world of education is increasingly broader knowledge (Posch & Steiner, 2006). Education provides a very important lesson for humans regarding the world around them, can develop a perspective in looking at life (Freel & de Jong, 2009).

With education, it can eradicate wrong beliefs in the human mind(Jackson, 2019). And it can also help in producing a good picture of things around us (Alpian et al., 2019). One of the supporting factors in moving a country forward is its reliable and quality society (Latuconsina, 2023). A reliable and good quality society is really needed by a country when compared to its abundant natural

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resources (Bruggeman et al., 2021), because even though the natural resources are abundant, the people are not able to process them well, so this will only be a waste (Hu, 2010).
Creating a quality society is certainly not easy because it takes time to provide serious and quality teaching from educational institutions (Tavakoli & Zarrinabadi, 2018). Therefore, efforts to improve the quality of education are something that cannot be changed in order to improve society and the Indonesian nation. Related to this problem, one of the things that a reliable society must have is a literate society, which means skills in literacy (reading and writing) (Halkic & Arnold, 2019). The ability to read can have an influence on the acquisition of various kinds of information that are related to efforts to live life (competence) (Bagheri et al., 2013).

By having a lot of information, it will indirectly form a society that is not only able to live its life but is also able to appreciate life and participate in the progress of its nation (Gebauer et al., 2012). Interest in reading is a desire or tendency towards reading (Hsiao & Hsu, 2018). This definition aligns with the opinion expressed by Brockmann et al., (2008) namely, a person's tendency to be interested in reading will encourage that person to do something related to reading. Students' interest in reading must be developed from an early age (Rycroft, 2007). Reading is a desire and also a desire to progress and achieve success (Baartman & de Bruijn, 2011).

The situation in Indonesia, as indicated by the results of the 2018 Program for International Student Assessment (PISA), is cause for concern. Indonesia has consistently fallen short of attaining the average score of Organization for Economic Co-Operation and Development (OECD) countries in the PISA assessment (Fassbender et al., 2022). The results of the 2018 PSA Survey actually found Indonesia in 74th place, namely the lowest score in reading ability was 371, mathematics ability was ranked 73rd with 379 points, and science ability was ranked 71st with a score of 396 (Martín-Rojas et al., 2013). Our society's low interest in numeracy literacy has greatly influenced the caliber of the Indonesian populace.

Insufficient numerical skills Lack of literacy hinders our ability to stay updated with advancements in science and information worldwide, thus leaving the Indonesian population at a disadvantage (Røkenes & Krumsvik, 2016). Reading culture in developed countries has become something that is very necessary in everyday life (Kunter et al., 2013). Therefore, the efforts made by developed countries need to be emulated, specifically, fostering a passion for reading at a young age, both at elementary, middle and high school levels and implementing it in their daily lives (Alerasoul et al., 2022). A significant decline in students' literacy and numeracy abilities occurred in junior high school, students' literacy and numeracy abilities decreased significantly (Yin et al., 2020). Teaching and learning activities are limited because there are still many students in grades (7, 8 and 9) whose levels of literacy, numeracy, and technological adaptability have significantly declined. In terms of literacy, there are still students who cannot spell, cannot read, understand, and do not know the correct pronunciation of consonant sounds and vowels (Leal-Rodríguez & Albort-Morant, 2019).

In numeracy, there are students who are not good at KABATAKU (multiply, divide, add, subtract) (Nguyen et al., 2023). In technology adaptation, students cannot use technology as well as possible because school facilities and infrastructure do not support it, so in the students' view technology is only for playing games, social media and watching films (Cohen & Levinthal, 2000). In fact, the use of technology can significantly enhance the learning process. Current developments that will always occur require various innovations in the field of education (Kiemer et al., 2015)..
The objective of this study is to provide a thorough analysis of the impact of literacy, numeracy and technological adaptation on differentiated learning and its impact on the agility of student competency and absorption capacity in Serang City, Banten Province.

2. LITERATURE REVIEW

2.1 THE RELATIONSHIP OF LITERACY TO DIFFERENTIATED LEARNING INNOVATION

Literacy is the information ability that a person has when managing the reading and writing process (Greene & Jones, 2023). Upon deeper examination, other definitions of literacy emerge. However, in essence, literacy can be succinctly defined as the aptitude to comprehend written

language and engage in written communication (Uekubo et al., 2024). The objectives of literacy encompass enhancing an individual's knowledge through reading, refining the ability to draw informed conclusions from written information, cultivating critical evaluation skills for written works, nurturing virtuous character traits, enhancing personal values, and optimizing the effective utilization of time (Hatzimanouil, 2023). The benefits of literacy are increasing word vocabulary, optimizing brain performance, gaining new knowledge, improving interpersonal skills, improving verbal skills, improving analytical focus, and improving word composing and writing (Campo-Meneses et al., 2023). literacy is closely related to innovation in differentiated learning. This is confirmed by research conducted by Chen et al., (2019), Ennis (2015), Janke et al., (2012), Mackey et al., (2023), Wu et al., (2022), and Wurster et al., (2023) which states that Literacy is able to significantly influence Differentiated Learning Innovation in students.
H1: Literacy influences Differentiated Learning Innovation

2.2 THE RELATIONSHIP OF NUMERACY TO DIFFERENTIATED LEARNING INNOVATION

Numeracy is the capacity to analyze using numbers (Wilcox & Lawson, 2018). Numeracy can also be referred to as "numeracy literacy". Numeracy abilities are employed to facilitate the resolution of common life challenges, for example we often find information regarding political and economic health, all of which is usually presented in numerical or graphical form. So, to understand it requires numeracy skills. Someone who has mathematical abilities does not necessarily have numeracy abilities. With this, it can be said that literacy and numeracy skills are useful for improving the quality of a nation in this era of technological development (Cohen & Levinthal, 2000). Literacy and numeracy competencies are fundamental abilities (Zanata et al., 2024). In short, the scope of numeracy literacy is mathematical knowledge that is practical and realistic in nature. However, it still has broad coverage, not only in the field of mathematics, but also in connection with other literacies (National Literacy Movement, 2017). Numeracy is closely related to innovation in differentiated learning. This is confirmed by research conducted by Beilock & Maloney (2015), Deunk et al., (2018), Foster (2022), Kiger et al., (2012), Tomlinson et al., (2003), and Willacy & Calder (2017) which states that Numeracy is able to significantly influence Differentiated Learning Innovation in students.
H2: Numeracy influences Differentiated Learning Innovation

2.3 THE RELATIONSHIP BETWEEN TECHNOLOGY ADAPTABILITY AND DIFFERENTIATED LEARNING INNOVATION

The pervasive integration of digital technology into several domains of life has the potential to facilitate and streamline tasks, provided it is utilized effectively. Hence, it is crucial to intensify endeavors to incorporate technology in this era of upheaval. School serves as an institution where students acquire knowledge in a structured setting, therefore facilitating literacy activities as part of the educational process. Nevertheless, it is a truth that kids' literacy levels tend to persist at a low level (Pimentel et al., 2024). This is due to the inadequate achievement of the literacy process by pupils, which hinders their capacity to fully comprehend numeracy literacy and effectively adapt to technology (Regina et al., 2024). To foster the development of students' character and enable them to serve as exemplary figures for their peers, it is imperative to enhance reading, numeracy, and technological proficiency in schools. In this Digital Era, the ability to adapt technology is something that is being pursued, especially in the world of education which is currently in a period of emergency, forcing learning adaptations. Technology adaptability is also closely related to differentiated learning innovation. This is confirmed by research conducted by Huynh et al., (2023), Luo (2020), Santos-Vijande et al., (2012), J. Wang & Jou (2023), Xue et al., (2023), and Zeng et al., (2023) which states that Technology Adaptability is able to significantly influence Differentiated Learning Innovation in students.
H3: Technology Adaptability influences Differentiated Learning Innovation

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2.4 THE RELATIONSHIP BETWEEN LITERACY AND AGILITY, ABSORPTIVE CAPACITY, COMPETENCY OF STUDENTS

Numeracy refers to the capacity to utilize numerical concepts in practical situations. Proficiency in literacy and numeracy is crucial for a nation's advancement, as nearly every facet of existence necessitates these skills. Numeracy literacy abilities are essential in all aspects of life, such as entrepreneurship, healthcare, and even national affairs. For instance, to comprehend data pertaining to economics and politics. Hence, it is crucial to enhance proficiency in reading, writing, and mathematical abilities within this domain. Literacy is closely related to students' absorption agility in the learning process. This is confirmed by research conducted by Bybee & McCrae (2011), Delgadova (2015), Falloon (2020), Foo et al., (2014), Gutierrez de Blume et al., (2021), and Shao & Purpur (2016) which states that Literacy is able to significantly influence the Agility and Competency Absorption of Students.

H4: Literacy influences the Agility of Students' Competency Absorption

2.5 THE RELATIONSHIP BETWEEN NUMERACY AND AGILITY, ABSORPTIVE CAPACITY, COMPETENCY OF STUDENTS

Numerical literacy refers to the proficiency in utilizing diverse numerical values and symbols associated with fundamental mathematics to effectively address real-world challenges across different domains of daily existence (Boyatzis et al., 2017). The numeracy program was conceived in response to repeated low performance of students in international assessment tests such as PISA, PIRLS, TIMSS, and weak mechanisms to support students who are falling behind or not performing to the best of their ability. This program is conceptualized as a Teacher Education Program which aims to improve students' learning outcomes in early literacy and numeracy skills by developing an understanding of how quality teaching in literacy and numeracy works, as well as equipping them with the skills necessary for effective teaching and learning (Freel & de Jong, 2009). This is confirmed by research conducted by research conducted by Dray et al., (2010), Edens & Potter (2013), Gregory et al., (2019), Hoareau & Tazouti (2023), Joyce et al., (2006), Ngware et al., (2019), and Tariq & Durrani (2012) which states that Numeracy is able to significantly influence the Ability and Competency Absorption of Students.

H5: Numeracy influences the Agility of Students' Competency Absorption

2.6 THE RELATIONSHIP BETWEEN TECHNOLOGY ADAPTABILITY AND AGILITY, STUDENT COMPETENCY ABSORPTION

In this era of digital technology, it offers many conveniences in obtaining and disseminating information. This has its own positive and negative sides. This means that if used properly technology will bring benefits to its users. On the other hand, if it is not used properly, it will have negative effects (Røkenes & Krumsvik, 2016). The benefits of digital technology include making it easier to obtain information, facilitating communication, stimulating creativity, and facilitating the learning process (Ministry of Education and Culture, 2018). Apart from offering benefits, it turns out that technological developments can also have negative effects, from physical disorders to mental disorders. Therefore, the ability to adapt to digital technology is very necessary, so that technological developments in this era become an opportunity to compete with other nations. Technology adaptability is of course closely related to the agility of students' ability to absorb competencies. This is confirmed based on research carried out by Abu Talib et al., (2021), Bang et al., (2023), Hack-Polay et al., (2023), Kim et al., (2018), Mills et al., (2021), Tavitiyaman et al., (2023) which states that Technology Adaptability is able to significantly influence Student Competency Absorption Agility

H6: Technology Adaptability to Student Competency Absorption Agility

2.7 THE RELATIONSHIP BETWEEN DIFFERENTIATED LEARNING INNOVATION AND AGILITY, ABSORPTIVE CAPACITY, COMPETENCY OF STUDENTS

Differentiated learning is learning that is developed to respond to students' learning needs which can be different, including learning readiness, interests, potential or learning styles (Sun et al., 2022). Basically, differentiated learning allows each teacher to meet and interact with students

at a level commensurate with their level of knowledge to then prepare their learning preferences. For this reason, differentiated learning aims to create equality of learning for all students and bridge the learning gap between those who achieve and those who do not achieve. In short, differentiated learning is a learning process that is created in such a way that students feel challenged to learn (Zainuddin et al., 2020). Apart from that, we may also have children who enjoy learning and collaborating in a small group, while some children prefer to learn independently. Therefore, of course, differentiated learning innovation is closely related to the agility of students' ability to absorb competencies. This is also confirmed by research conducted by Akimov et al., (2023), Gabarda Méndez et al., (2023), M. Keinänen et al., (2018), MM Keinänen & Kairisto-Mertanen (2019), McAllister et al., (2023) Ojo & Volkova (2023), Ovbiagbonhia et al., (2019b, 2019a), Pérez-Sanagustín et al., (2022), Prihandono et al., (2023), Sevillano-Monje et al., (2022), and S. Wang et al., (2023) which states that Differentiated Learning Innovation is able to significantly influence the Agility and Competency Absorption of Students.

H7: Differentiated Learning Innovation on Student Competency Absorption Agility

H8: Literacy influences the Agility, Absorptive Capacity, Competency of Differentiated Learning Innovation Students

H9: Numeracy influences Agility, Absorptive Capacity, Competency of Differentiated Learning Innovation Students

H10: Technology Adaptability influences Agility, Absorptive Capacity, Student Competency, Differentiated Learning Innovation

3. METHODOLOGY

The research method used uses associative quantitative research methods by looking for relationships between variables, data collection is carried out using survey techniques using questionnaires distributed to respondents. The location of the research in Surabaya City, East Java Province, Indonesia. This research utilizes both secondary and primary data sources. The secondary data was obtained from the statistical data of Susrabaya City BPS, and data from trusted sources. The research theory study was also taken from several references from relevant previous research, from electronic data references and from library references. Meanwhile, the primary research data uses data obtained from questionnaire data.

The population in this study were 8 schools located in six sub-districts in Surabaya City,. The research used Stratified Random sample as the sample technique, as the population members are not homogeneous and are selected based on age, occupation, and education level. The sample size can be determined using a table that provides the number of samples required at error levels of 1%, 5%, and 10%, which was established by Isaac and Michel (Sugiyono, 2015), regarding determining the population size (N) = 124,874 with an error level of 10 percent obtained 124,874 or the same as 125 respondents.

The data collection method involves employing accidental sampling strategies (Ghozali, 2018). The research employs quantitative analysis for data analysis. Partial Least Square (PLS) analysis is employed in quantitative analysis to address difficulties. Partial Least Squares (PLS) can serve as a viable alternative to Structural Equation Modeling (SEM), which is characterized by a limited theoretical foundation. PLS can be employed to confirm existing theories (Hair et al., 2017). Partial Least Squares (PLS) is a statistical method that utilizes the Structural Equation Modeling (SEM) model to address the issue of correlations among intricate variables, particularly when the sample size of the data is limited. The SEM method requires a minimum sample size of 100 data points (Ghozali & Latan, 2017).

4. RESULTS AND DISCUSSION

4.1 STRUCTURAL MODEL TESTING (INNER MODEL)

An inner model elucidates the connection between latent variables, drawing upon substantive theory. When evaluating the model using Partial Least Squares (PLS), begin by examining the R-squares for each dependent latent variable. Inner model testing allows for the examination of the link between constructs by comparing the significance and R-square values of the research model (Ghozali & Latan, 2017).

Table 1. R-Squares Value

Endogenous Variables	R-Square
Differentiated Learning Innovation	0.835
Student Competencies	0.819

Source: Processed data, 2023.

In Table 1, the R-square value for the Creativity variable is 0.835. This indicates that 83.5 percent of the variation in the Creativity variable can be explained by the Literacy, Numeracy, and Technology Adaptation variables. The remaining 16.5 percent of the variation is attributed to factors that are not included in the model.

The R-Square value of 0.819 for the Student Competency Absorption Agility variable indicates that 81.9 percent of the variability can be accounted for by the Literacy, Numeracy, Technology Adaptation, and Differentiated Learning Innovation variables, while the remaining 18.1 percent is attributed to factors not included in the model.

The R-square values displayed in Table 1 are 0.835 and 0.819, indicating a reasonable level of correlation. The Q^2 value of structural model testing is determined by assessing its predictive relevance. The formula for calculating Q^2 can be utilized as follows:

$Q^2 = 1 - (1-R12) (1-R22)$
$Q^2 = 1 - (1-0.835) (1-0.819)$
$Q^2 = 0.970$

The Q^2 calculations indicate that the Q^2 value is 0.970. According to Hair et al. (2012), the Q^2 value is a useful metric for evaluating the accuracy of observation values generated by a model and its parameter estimations, a Q^2 value greater than zero implies that the model is considered satisfactory, whereas a Q^2 value less than zero suggests that the model lacks predictive validity. In this research model, the construct or endogenous latent variable possesses a Q^2 value greater than zero, indicating that the predictions made by the model are deemed significant.

4.2 DIRECT EFFECT TESTING

The figure, labeled as Figure 1, presents the hypothesis testing related to the impact of the variables Literacy, Numeracy, Technology Adaptation, Differentiated Learning Innovation, and Student Competency.

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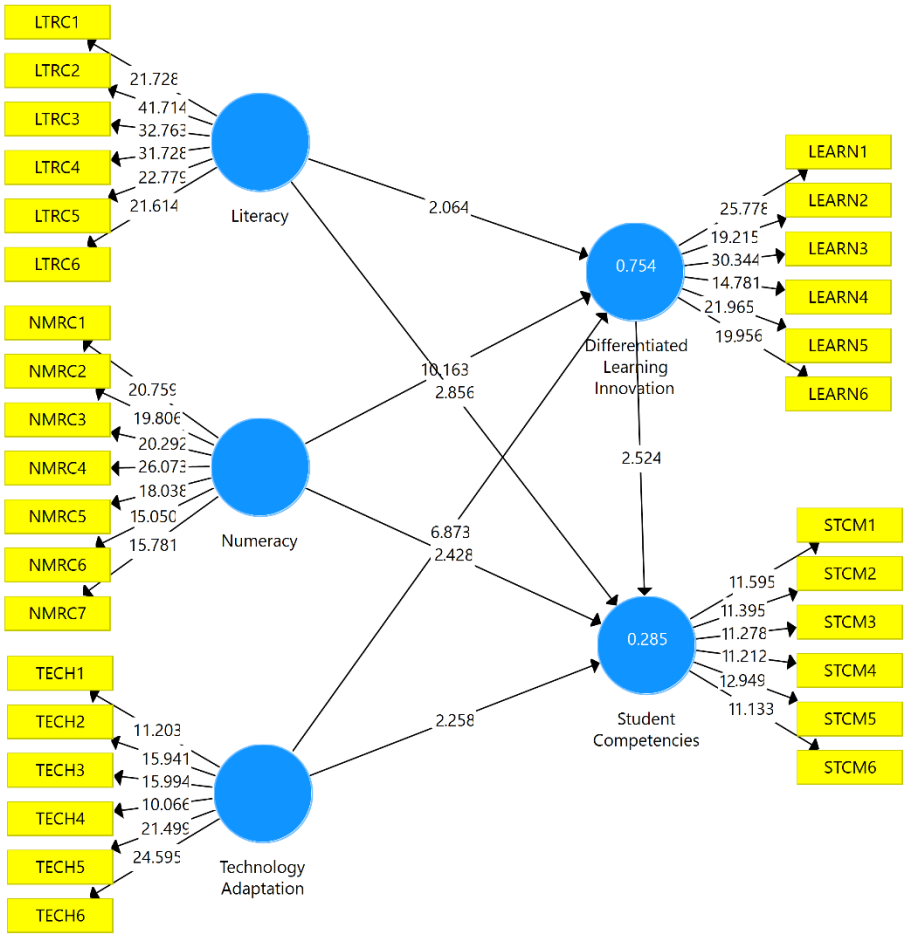

Figure 1. Statistical t value of the Path Analysis Model
Source: Processed data, 2023

The PLS approach employs simulations to test hypotheses for each hypothesized association. In this scenario, the sample is subjected to the bootstrap method. The bootstrap approach serves to mitigate the issue of non-normality in the study data utilized. The T-table value with a significance level of 5% was previously established as 1.64 in this investigation. All path coefficients exhibit statistical t values greater than 1.64.

Table 1. Direct Effect

	Original Sample (O)	T Statistical	Significance
Literacy -> Differentiated Learning Innovation	0,205	2,064	0,003
Numeracy -> Differentiated Learning Innovation	0,258	10,163	0,001
Technology Adaptation -> Differentiated Learning Innovation	0,132	6,873	0,000
Literacy -> Student Competencies	0,541	2,856	0,002
Numeracy -> Student Competencies	0,535	2,428	0,009
Technology Adaptation -> Student Competencies	0,582	2,258	0,007

Differentiated Learning Innovation -> Student Competencies	0,607	2,524	0,004

The path coefficient results obtained in the first hypothesis between literacy and differentiated learning innovation obtained an Original Sample (O)/Path Coefficients value of 0.205 (positive value), meaning that if literacy increases by one unit then differentiated learning innovation can increase by 20.5% and the effect this is positive. T-Statistics of 2.064 ≥ 1.64 with a significant P-Value of 0.003 ≤ 0.05, it is concluded that there is a significant influence between literacy and differentiated learning innovation. A positive value on the path coefficient means that the better the literacy, the better the differentiated learning innovation.

The path coefficient results obtained in the second hypothesis between numeracy and differentiated learning innovation obtained an Original Sample (O)/Path Coefficients value of 0.258 (positive value), meaning that if numeracy increases by one unit then differentiated learning innovation can increase by 25.8% and the effect this is positive. T-Statistics of 10.163 ≥ 1.64 with a significant P-Value of 0.001 ≤ 0.05, it is concluded that there is a significant influence between numeracy on differentiated learning innovation. A positive value on the path coefficient means that the better the numeracy, the better the differentiated learning innovation.

The path coefficient results obtained in the third hypothesis between adaptability and differentiated learning innovation obtained an Original Sample (O)/Path Coefficients value of 0.132 (positive value), meaning that if adaptability increases by one unit then differentiated learning innovation can increase by 13.2% and the effect this is positive. T-Statistics of 6.873 ≥ 1.64 with a significant P-Value of 0.002 ≤ 0.05, it is concluded that there is a significant influence between adaptability and differentiated learning innovation. A positive value on the path coefficient means that the better the adaptability, the better the differentiated learning innovation.

The results of the path coefficient obtained in the fourth hypothesis between literacy and the agility of students' ability to absorb competence, obtained an Original Sample (O)/Path Coefficients value of 0.541 (positive value), meaning that if literacy increases by one unit, the agility of students' ability to absorb competence can increase by 54. 1% and this influence is positive. T-Statistics of 2.856 ≥ 1.64 with a significant P-Value value of 0.002 ≤ 0.05, it is concluded that there is a significant influence between literacy and the agility of students' ability to absorb competencies. A positive value on the path coefficient means that the better the literacy, the better the agility of students' ability to absorb competencies.

The results of the path coefficient obtained in the fifth hypothesis between numeration and the agility of students' ability to absorb competence, obtained an Original Sample (O)/Path Coefficients value of 0.535 (positive value), meaning that if numeracy increases by one unit, the agility of students' ability to absorb competence can increase by 53. 5% and this influence is positive. T-Statistics of 2.428 ≥ 1.64 with a P-Value value of 0.009 ≤ 0.05 is significant, it is concluded that there is a significant influence between numeracy on the agility of students' competency absorption. A positive value on the path coefficient means that the better the numeracy, the better the student's competency absorption ability.

The results of the path coefficient obtained in the sixth hypothesis between adaptability and the agility of students' competency absorption capacity obtained an Original Sample (O)/Path Coefficients value of 0.582 (positive value), meaning that if adaptability increases by one unit then the agility of students' competency absorption capacity can increase by 58. 2% and this influence is positive. T-Statistics of 2.258 ≥ 1.64 with a significant P-Value of 0.007 ≤ 0.05, it is concluded that there is a significant influence between adaptability on the agility of students' competency absorption. A positive value on the path coefficient means that the better the adaptability, the better the agility of students' ability to absorb competencies.

The results of the path coefficient obtained in the seventh hypothesis between differentiated learning innovation and the agility of student competency absorption capacity obtained an Original Sample (O)/Path Coefficients value of 0.607 (positive value), meaning that if differentiated learning innovation increases by one unit then the agility of student competency absorption capacity can increased by 60.7% and this influence was positive. T-Statistics of 2.524 ≥ 1.64 with a P-Value value of 0.004 ≤ 0.05 is significant, it is concluded that there is a significant influence between

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differentiated learning innovation on the agility and absorption of student competencies. A positive value on the path coefficient means that the better the differentiated learning innovation, the better the agility of student competency absorption.

Table 2. Direct Effect

	Original Sample (O)	T Statistical	Significance
Literacy -> Differentiated Learning Innovation -> Student Competencies	0,173	2,070	0,042
Numeracy -> Differentiated Learning Innovation -> Student Competencies	0,229	3,175	0,015
Technology Adaptation -> Differentiated Learning Innovation -> Student Competencies	0,576	3,464	0,000

From the results of the analysis of Specific Indirect Effects in the eighth hypothesis using SmartPLSV.3.2.9 as in table 3 Specific Indirect Effects above, it was found that the relationship between literacy and the agility of students' competency absorption capacity through the mediation of differentiated learning innovations obtained an Original Sample value (O) = 0.173, meaning that if literacy Indirectly, by increasing one unit of differentiated learning innovation, student competency absorption agility can increase by 17.3% and this influence is positive. T = 2.070 ≥ 1.64, P-Value 0.042 ≤ 0.05 is positive. A positive value on the path coefficient means that the better the literacy, the better the agility of students' ability to absorb competencies through differentiated learning innovation.

Apart from that, the results of the analysis of Specific Indirect Effects in the ninth hypothesis using SmartPLSV.3.2.9 as in table 3 Specific Indirect Effects above, found that the relationship between numeracy and agility, the ability to absorb student competencies through the mediation of differentiated learning innovation, obtained an Original Sample (O) value = 0.229, meaning that if Indirectly, literacy through differentiated learning innovation increases by one unit, so student competency absorption agility can increase by 22.9% and this influence is positive. T = 3.175 ≥ 1.64, P-Value 0.015 ≤ 0.05 is positive. A positive value on the path coefficient means that the better the numeracy, the better the agility of students' ability to absorb competencies through differentiated learning innovation.

Then the results of the analysis of Specific Indirect Effects on the tenth hypothesis using SmartPLSV.3.2.9 as in table 3 Specific Indirect Effects above found that the relationship between adaptability and agility, ability to absorb student competence through the mediation of differentiated learning innovation, obtained an Original Sample (O) value = 0.576, meaning that if literacy Indirectly, by increasing one unit of differentiated learning innovation, student competency absorption agility can increase by 57.6% and this influence is positive. T = 3.464 ≥ 1.64, P-Value 0.000 ≤ 0.05 is positive. A positive value on the path coefficient means that the better the adaptability, the better the agility of student competency absorption through differentiated learning innovation.

4.3 DISCUSSION

The Influence of Literacy on Differentiated Learning Innovation

According to the research findings, the first hypothesis can be interpreted as that literacy can have a beneficial and substantial influence on differentiated learning innovation. This means that increasing literacy will increase Differentiated Learning Innovation. This research is corroborated by research conducted by Chen et al., (2019), Ennis (2015), Janke et al., (2012), Mackey et al., (2023), Wu et al., (2022), and Wurster et al., (2023) which states that Literacy is able to significantly influence Differentiated Learning Innovation in students.

The results of this study can also contribute to the goal of promoting literacy, which involves enhancing individuals' knowledge through reading, improving their ability to draw inferences from the information they read, fostering critical evaluation of written material, and cultivating positive character traits. an individual, enhancing personal values, and optimizing time management

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(Hatzimanouil, 2023). Likewise, it can help in terms of the benefits of literacy, namely increasing word vocabulary, optimizing brain performance, gaining new knowledge, improving interpersonal skills, improving verbal abilities, improving focus power analysis, and improving word composing and writing (Campo-Meneses et al., 2023).

This research provides the meaning that in an effort to increase differentiated learning innovation, it is also necessary to increase literacy in students. If student literacy can be improved, it will have a significant impact on differentiated learning innovation.

The Influence of Numeracy on Differentiated Learning Innovation

Based on the findings from the research results, the second hypothesis means that Numeracy can exert a beneficial and substantial impact on Differentiated Learning Innovation. This means that increasing numeracy will increase Differentiated Learning Innovation. This research is confirmed by research conducted by Beilock & Maloney (2015), Deunk et al., (2018), Foster (2022), Kiger et al., (2012), Tomlinson et al., (2003), and Willacy & Calder (2017) which states that Numeracy is able to significantly influence Differentiated Learning Innovation in students.

Someone who has mathematical abilities does not necessarily have numeracy abilities. With this, it can be said that literacy and numeracy skills are useful for improving the quality of a nation in this era of technological development (Cohen & Levinthal, 2000). Literacy and numeracy competencies are fundamental abilities. In short, the scope of numeracy literacy is mathematical knowledge that is practical and realistic in nature.

However, it still has broad coverage, not only in the field of mathematics, but also in connection with other literacies (National Literacy Movement, 2017). This research means that in an effort to increase differentiated learning innovation, it is also necessary to increase numeracy in students. If student numeracy can be improved, it will have a significant impact on differentiated learning innovation.

The Influence of Technology Adaptability on Differentiated Learning Innovation

Based on the findings from the research results, the third hypothesis can be interpreted as that Technology Adaptability can have a beneficial and substantial influence on Differentiated Learning Innovation. This implies that the growing adaptability of technology will enhance the innovation of differentiated learning. This research is corroborated by research conducted by Huynh et al., (2023), Luo (2020), Santos-Vijande et al., (2012), J. Wang & Jou (2023), Xue et al., (2023), and Zeng et al., (2023) which states that Technology Adaptability is able to significantly influence Differentiated Learning Innovation in students. School is actually a place for students to formally gain knowledge, therefore literacy ac Various activities take place during the process of teaching and learning.

However, it is a truth that kids' reading levels tend to persist at a low level. This is due to the inadequate achievement of the literacy process by students, which prevents them from attaining the desired objectives. Consequently, they are unable to fully comprehend numeracy literacy and develop proficiency in adapting to technology. In order to foster the development of students' character and enable them to serve as exemplary figures for their peers, it is imperative to enhance literacy, numeracy, and technological proficiency inside schools.

In this Digital Era, the ability to adapt technology is something that is being pursued, especially in the world of education which is currently in a period of emergency, forcing learning adaptations. This research provides the meaning that in an effort to increase differentiated learning innovation, it is also necessary to increase adaptability in students. If student adaptability can be increased, it will have a significant impact on differentiated learning innovation.

The Influence of Literacy on Students' Competency Absorption Agility

Based on the findings from the research results, the fourth hypothesis can be interpreted as that literacy can have a positive and significant influence on students' agility and competency absorption capacity. This means that as Literacy increases, it will increase the Agility and Competency Absorption of Students. This research is confirmed by research conducted by Bybee & McCrae (2011), Delgadova (2015), Falloon (2020), Foo et al., (2014), Gutierrez de Blume et al.,

(2021), and Shao & Purpur (2016) which states that Literacy is able to significantly influence the Agility and Competency Absorption of Students.

Literacy is able to influence students' absorption agility which can maximize students' creativity, especially in the current era. Proficiency in literacy and numeracy is crucial for safeguarding a nation's advancement and preventing it from falling behind, as nearly every facet of life necessitates these skills. Numeracy literacy abilities are essential in all aspects of life, including entrepreneurship, healthcare, and national affairs. For instance, to comprehend data pertaining to economics and politics (Basrowi & Utami, 2023).

Hence, it is crucial to enhance proficiency in reading, writing, and mathematical abilities within this domain. This research provides the meaning that in an effort to increase the agility of students' ability to absorb competencies, it is also necessary to increase literacy among students. If student literacy can be improved, it will have a significant impact on the agility of students' ability to absorb competencies (Purwaningsih, 2020; Purwaningsih et al., 2018, 2022).

The Influence of Numeracy on Agility and Absorption of Students' Competencies

Based on the findings from the research results, the fifth hypothesis can be interpreted as meaning that Numeracy can have a positive and significant influence on Student Competency Absorption Agility. This means that as numeracy increases, it will increase students' agility and competency absorption capacity. This research is corroborated by studies undertaken by Dray et al., (2010), Edens & Potter (2013), Gregory et al., (2019), Hoareau & Tazouti (2023), Joyce et al., (2006), Ngware et al., (2019), and Tariq & Durrani (2012) which states that Numeracy is able to significantly influence the Ability and Competency Absorption of Students (Basrowi & Maunnah, 2019; Basrowi & Utami, 2020).

The numeracy program was conceived in response to repeated low performance of students in international assessment tests such as PISA, PIRLS, TIMSS, and weak mechanisms to support students who are falling behind or not performing to the best of their ability. This program is conceptualized as a Teacher Education Program which aims to improve students' learning outcomes in early literacy and numeracy skills by developing an understanding of how quality teaching in literacy and numeracy works, as well as equipping them with the skills necessary for effective teaching and learning (I Gusti Gede Heru Marwanto Basrowi, 2020; Marwanto et al., 2020; Soenyono & Basrowi, 2020).

This research provides the meaning that in an effort to increase the agility of students' ability to absorb competencies, it is also necessary to increase students' numeracy. If student numeracy can be improved, it will have a significant impact on the agility of students' ability to absorb competencies.

The Influence of Technology Adaptability on Student Competency Absorption Agility

Based on the findings from the research results, the sixth hypothesis can be interpreted as that Technology Adaptability can have a positive and significant influence on Student Competency Absorption Agility. This means that the increasing Adaptability of Technology will increase the Agility of Students' Competency Absorption. This research is corroborated by research conducted by Abu Talib et al., (2021), Bang et al., (2023), Hack-Polay et al., (2023), Kim et al., (2018), Mills et al., (2021), Tavitiyaman et al., (2023) which states that Technology Adaptability is able to significantly influence Student Competency Absorption Agility.

Apart from offering benefits, it turns out that technological developments can also have negative effects, from physical disorders to mental disorders. Therefore, the ability to adapt to digital technology is very necessary, so that technological developments in this era become an opportunity to compete with other nations. This research provides the meaning that in an effort to increase the agility of students' ability to absorb competencies, it is also necessary to increase students' adaptability. If students' adaptability can be increased, it will have a significant impact on the agility of students' ability to absorb competencies.

The Effect of Differentiated Learning Innovation on Agility and Student Competency Absorption

Based on the findings from the research results, the seventh hypothesis can be interpreted as that Differentiated Learning Innovation can have a positive and significant influence on Student Competency Absorption Agility. This means that the increasing number of Differentiated Learning Innovations will increase the Agility and Competency Absorption of Students. This research is confirmed by research conducted by Akimov et al., (2023), Gabarda Méndez et al., (2023), M. Keinänen et al., (2018), MM Keinänen & Kairisto-Mertanen (2019), McAllister et al., (2023) Ojo & Volkova (2023), Ovbiagbonhia et al., (2019b, 2019a), Pérez-Sanagustín et al., (2022), Prihandono et al., (2023), Sevillano-Monje et al., (2022), and S. Wang et al., (2023) which states that Differentiated Learning Innovation is able to significantly influence the Agility and Competency Absorption of Students (Alexandro & Basrowi, 2024b, 2024a).

Basically, differentiated learning allows each teacher to meet and interact with students at a level commensurate with their level of knowledge to then prepare their learning preferences. For this reason, differentiated learning aims to create equality of learning for all students and bridge the learning gap between those who achieve and those who do not achieve (Hamdan & Basrowi, 2024; Miar et al., 2024; Nuryanto et al., 2019). In short, differentiated learning is a learning process that is created in such a way that students feel challenged to learn (Zainuddin et al., 2020).

It is important to know that some students definitely have a good level of knowledge about a particular learning topic, while other students do not because these students have completely new knowledge about that topic. This research means that in an effort to increase the agility of students' competency absorption, it is also necessary to increase differentiated learning innovation for students. If differentiated learning innovation for students can be improved, it will have a significant impact on the agility of students' ability to absorb competencies.

The Influence of Literacy, Numeracy, and Technology Adaptability on Student Competency Absorption Agility through Differentiated Learning Innovations

Based on the findings from the research results, the eighth, ninth and tenth hypotheses mean that Literacy, Numeracy and Technological Adaptability can have a positive and significant influence on Student Competency Absorption Agility through Differentiated Learning Innovation. This means that through the mediation of Differentiated Learning Innovation, Literacy, Numeracy and Technological Adaptability, it has a fairly large positive impact on Student Competency Absorption Agility (Junaidi, Basrowi, et al., 2024; Kittie & Basrowi, 2024; Yusuf et al., 2024). The findings of this research indicate that Differentiated Learning Innovation significantly increases the Agility of Student Competency Absorption by moderating the relationship between Literacy, Numeracy, Technology Adaptability and Student Competency Absorption Agility (Hadi et al., 2019; Hamdan & Basrowi, 2024; Mulyani & Basrowi, 2024). This also shows how Differentiated Learning Innovation and the type of mediation carried out, namely partial mediation with competitive partial mediation, can have an impact both directly and indirectly on Student Competency Absorption Ability. This shows that the independent variable has a strong ability both directly and indirectly on the dependent variable, and competitive partial mediation occurs if the coefficient is positive (Junaidi, Masdar, et al., 2024; Miar et al., 2024; Purwaningsih et al., 2024).

5. CONCLUSION

The objective of this study is to examine the impact of literacy, numeracy and technological adaptation on differentiated learning innovation and the effect it has on the ability and proficiency of high school pupils in Serang City, Banten Province. Based on the analysis of the results in this study, it can be inferred that Literacy, Numeracy, and Technological Adaptability have a direct, positive, and significant impact on differentiated learning innovation in State Senior High Schools in Serang City; Apart from that, Literacy, Numeracy, Technological Adaptability and The implementation of Differentiated Learning Innovation has a direct and substantial impact on the agility of students' competency absorption capacity in State High Schools throughout Serang City; Differentiated learning innovation is able to partially mediate literacy, numeracy and technological adaptability on the agility of students' competency absorption capacity in State Senior High Schools in Serang City, Banten Province.

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