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The Effect of Teacher Training, Technology Literacy and Self-Efficacy for Integrating Technology

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Abstract: The Effect of Teacher Training, Technology Literacy and Self-Efficacy for Integrating Technology. **Objectives**: The objects in this research are teacher training, teacher technological literacy, teacher self-efficacy and integration of technology in learning. **Methods**: This research uses quantitative methodology through path regression analysis where data processing includes testing classical assumptions, testing path equation model regressions, and then determining the magnitude and direction of correlation between path variables. The research data source was obtained from Transformational High School in Gunung Kidul Regency. There were 182 teachers who were willing to be respondents to fill out a research questionnaire. It comprises of 151 questions, which are valid and reliable from a Likert scale model. The sample size is quantified based on the Slovin formula in which the minimum required sample is 143 samples. **Findings**: The findings reveal that the integration of learning technology in direct relationships is contributed from teacher training and literacy technology at 8.6%, from self-efficacy at 6.8% and from teacher training, technology literacy, and teacher self-efficacy at 47% when analysed simultaneously. For the indirect path, the contribution of training to technology integration is 0.64% which is mediated by literacy, and 7.29% which is mediated by self-efficacy, while for the indirect literacy path which is mediated by self-efficacy in integrating technology is 0.16%. **Conclusion**: In conclusion, there is a significant, consistent relationship, both directly and indirectly, for each variable in the correlation path among teacher training, technological literacy and teacher efficacy in facilitating the integration of technology into learning.

Keywords: training, literacy, self-eficacy, technology, integration.

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INTRODUCTION

The integration of technology in education has facilitated the rapid and efficient dissemination and acquisition of knowledge across diverse demographics. This allows individuals, irrespective of their location or the time, to access information tailored to their specific needs, thereby enhancing the potential for human resource development through educational technologies.

During the COVID-19 pandemic in 2020, technology enables learning. However, this period also highlighted significant challenges. Solihat et.al (2022) reported that there were substantial learning losses, with a 65.9% reduction in learning achievements and a 67.7% decline in learning outcomes. Additionally, the emergency curriculum's effectiveness was limited to about 63%, primarily due to educators' lack of technological skills (Rosmana et al., 2022).

Moreover, pandemic-related restrictions reduced daily learning to just 1-2 hours, exacerbating the situation. According to Cerelia

et al. (2021), 67% of teachers struggled with digital technology implementation, and about 20% faced difficulties accessing remote learning tools or monitoring student progress effectively. Subekti and Kurniawati (2022) found that half of the high school teachers in Yogyakarta felt constrained by technology and doubted its efficacy in enhancing online learning effectiveness. A research at PGRI University Yogyakarta indicated that 62% of students were very dissatisfied with the online learning experience during the pandemic (Dewantara & Nurgiansah, 2021).

Research in several other areas shows the lack of teacher literacy skills in mastering technology. For instance, Hakim (2021) reported that teacher literacy rates in three NTB elementary schools remained below 50%. Anggaraeni and Rola (2017) found that teacher technology literacy in Medan was critically low, with scores of 20.3% for technology literacy, 4.7% for media literacy, and 14.4% for visual literacy. Additionally, only 10% of elementary school teachers in Central Lombok understood the concept of ICT literacy in competency-based learning (Erfan et al., 2021). Also research on English lecturers at Indonesian universities demonstrated a correlation between technology use and application proficiency, revealing that 73.6% of lecturers were unable to utilize the Learning Management System due to minimal literacy levels (Hafifah & Sulistyo, 2020).

Several studies have highlighted the significant role of teacher efficacy and confidence in shaping the use and creative implementation of technology in educational settings (Mahdum et.al., 2019; Ikrom, 2020; Friskawati, 2021; Hardianto et.al., 2023). Teacher behavior to achieve goals in school activities is supported by the teacher's personal values which encourage teacher self-confidence. Teacher self-confidence is the capability of effective teachers to work professionally as educators and mentors and also helps them to overcome obstacles or problems in the process, which then has an impact on students' academic outcomes and well-being in the work environment. (Barni et.al., 2019). Teacher self-efficacy is crucial for educators as it influences their performance in their dual roles as teachers and mentors, enhancing their confidence in their professional practices and in their students, and thereby facilitating effective instructional organization (Gan, 2019).

To support the goal of national education in the 21st century in improving teachers' technological skills, the government supports the development of teacher human resources through essential training that supports pedagogical competence, technological skills and teacher professionalism. Training programs that are specific and relevant to teacher needs according to classroom learning practices are important support for teacher professionalization in increasing student productivity. (Haryono et.al., 2017). Various alternative forms of teacher professional development programs according to the Directorate General of Basic Education, Ministry of National Education, for example include competency-based integrated training programs, MGMP empowerment programs, and teacher symposiums (Sobri, 2016).

It is then essential to elaborate the inter-relationship of teacher trainng, technological literacy, teacher self-efficacy and technology integration in learning. The integration of technology (ICT) in education is significantly mediated by teacher self-efficacy which originates from personal factors such as self-confidence, competence, and resilience in using technology, but it is also mediated by external factors such as available time, teaching experience, and teacher attitudes. which can support or reject (Gbemu et al., 2020). Bandura (1997) coined teacher self-confidence as a value that originates from the concept of self-efficacy.

Self-efficacy fosters a robust sense of self-assurance among teachers, bolstering their

confidence in their abilities to enhance student learning and achievement (Gümüº & Bellibaº, 2021; Flores, 2016). However, teachers often encounter new challenges and situations which may induce negative attitudes towards the integration of technology in classroom learning (Dharma et.al., 2020). Furthermore, Vallejo et.al., (2016) discuss the psychological aspect of self-efficacy, viewing it as foundational in fostering effective human-computer interactions. The sources of teacher efficacy are multifaceted, originating from personal mastery experiences, vicarious experiences through observing others, verbal persuasion from trusted colleagues within their social network, and their emotional and mental states regarding their tasks (Bandura, 1997; Morgan & Lori, 2016; Paetcher et al., 2020; Kesvaraz, 2020; Wilde & Hsu, 2019; Mahfu et al., 2021; Shahzad & Naureen, 2017).

Computer-based education refers to the technological literacy, digital literacy and internet literacy capabilities of individuals who are skilled at using computers and digital tools functionally and disseminating information. (Yeºilyurt & Vezne, 2023). Yustika and Iswati (2021, p. 67) define digital literacy as the capability to read and interpret data within a digital environment, while Heitin (2016) viewed it as encompassing the identification and processing of digital content, creation of digital materials, and communication or sharing of this content. Cognitive literacy, involves factual knowledge about verbal and non-verbal labels and symbols, such as words, numbers, signs, and images, as well as the foundations for conceptual knowledge, which includes understanding classifications, categories, principles, generalizations, and the frameworks of theories, models, and structures (Wedlock & Growee, 2017). In addition, information literacy has become urgent in the rapid advancement of technological media in the work environment to evaluate, filter, understand and select the necessary information (Ali et al. 2022). Internet literacy is the interaction between human knowledge and skills with digital information tools in online networks such as using files and videos as applications for storing and exchanging information (Vijayalakshmi et al. 2020).

Teachers proficient in literacy can align their teaching with national policies, apply technology pedagogically based on curricular standards, and employ ICT in ways that enhance general and inclusive teaching methodologies, as well as their professional development (UNESCO, 2018). Heitin (2016) categorized technological literacy in learning into three main activities: discovery and consumption of content, creation of content, and communication and sharing of content. Technology literacy also includes skills using internet search engines, considering the social effects, and social and economic level of societies. (Ongel et.al., 2022)

Technology integration in education is essential. It involves the use of computer-based communication tools within daily classroom instruction to enhance the teaching and learning process (Ghavifekr & Rosdy, 2015, p.175). An effective integration of technology in teaching and learning (IITL) supports constructivist approaches by leveraging digital technology tools used by teachers and students (Tomaro & Mutiarin, 2018). The stages of technology integration range from the initial phase of Emerging, to Applying, Infusing, and ultimately Transforming the educational process (Chao, 2015). Moreover, the pedagogical integration of technology is evidenced through the design, implementation, and evaluation of learning activities (Herliani & Wahyudin, 2018).

Challenges to effective technology integration include issues related to professional development and the need for ongoing technical support. Tay et.al. (2013) highlighted obstacles of tecnology integration suc as the adequacy of teacher competencies and the frequency of computer use throughout a teacher's career.

World Bank report indicates common problems during the learning process, such as a lack of variation in teachers' strategies to actively engage students and limited pedagogical knowledge to support learning (Yarrow et.al., 2020). Accordingly, Chiu et.al., (2022) suggest that teachers should leverage technological tools and classroom dynamics to motivate students and activate their cognitive and emotional engagement, positioning them as active participants in their learning. Similarly, Gokalp (2013) empasized the importance of recognizing the unique needs of each learner to foster a dynamic and evolving educational experience.

It is important for teachers to adopt new educational technologies. Adopting new educational technologies necessitates providing teachers with the necessary training to reorient their primary roles from traditional lecturers to facilitators, a shift that emphasizes guiding and supporting students rather than solely delivering content (Ra, 2019). This need is underscored by findings from a global survey by Kenworthy & Kielstra, (2015) which revealed that 58% of teachers acknowledge that their students possess a superior understanding of technology compared to them. To address this gap, Ager & Mercer (2019) advocated for Continuing Professional Development (CPD), proposing it as an effective training strategy to sustain a teacher's commitment to their profession, enhance their motivation, and support their career development. Tomaro & Mutiarin (2018) added training for teachers, necessary to enrich teachers' technological literacy so that the quality of teacher services becomes more stable and they are able to implement technology that is in line with the curriculum in learning.

Training in this context is described as a targeted, intensive intervention designed to enhance specific skills, abilities, or strategies relevant to a teacher's duties (Kubik & Glogger-Frey, 2021). It involves systematic learning that not only aims to improve attitudes, knowledge, skills, and competencies but also boosts current performance and contributes to achieving organizational goals (Widodo, 2015).

Training programs should be in line with the needs, change, and context. Training programs are specifically designed to meet teachers' needs and align with classroom learning practices are crucial for supporting teacher professionalization and increasing student achievement (Haryono et.al, 2017). Such teacher training and ongoing professional development are pivotal for effective teaching. Teachers who enhance their technological knowledge and skills tend to be more confident when delivering instructional content to students, which not only boosts their own performance but also contributes to organizational progress (Ismail et.al., 2021). The 21st-century teacher competence involves effective teaching and classroom management, building strong relationships with students and the school community, and utilizing technology to continually refine teaching practices and learning instructions (Pamungkas, 2021). Human Resource (HR) development should systematically address training needs by identifying learner requirements, designing appropriate training, delivering content effectively, and evaluating outcomes (Tyson & York, 1996). Effective training design must include three competency components: cognitive, affective and psychomotor to develop teacher professionalism at work (Guskey, 2000). Kang et.al (2013) stated that training that can support teachers to develop students should focus on learning content, enable teachers to learn and participate in teams, coherent learning and the duration of training activities.

Training programs should also embrace active training principles. According to Rodrigues & Mogaro (2019), active training principles draw on theories from Piaget, Vygotsky, Arends, and Hargreaves. These principles include integrating

theoretical and practical perspectives, cross-curricular activities that bring together teachers from various disciplines, and adjusting implementations based on the needs and interests of participants. Training should allow for flexible planning and content management, with dynamic pedagogy that incorporates ongoing evaluation and reflection. It should foster participant independence, and collaborative practices, and leverage technology in ways that are pedagogically meaningful, emotionally positive, democratic, and cooperative.

In the context of Gunungkidul Transformational High School, the teacher and principal training programs are used as a basis for evaluation and development heading into the third stage of their agenda in 2024. These training programs, established to enhance the quality of education, encompass a broad spectrum of initiatives such as in-house training, workshops, learning communities for practitioners, and coaching programs. Furthermore, they focus on strengthening technological literacy, developing teacher profiles and competencies, and providing platforms for teacher learning and school resources. Additionally, educational report cards have been integrated to monitor progress. All these activities align with the overarching goal of cultivating a student profile that is not only academically intelligent and skilled but also embodies the Pancasila character. This development is in line with the adoption of the independent curriculum, reflecting a concerted effort to advance educational quality in response to contemporary curriculum demands (Zamjani et al., 2020; Syafi'i, 2021).

Despite various training initiatives aimed at enhancing teacher competency, there is a need to investigate how teacher training, technological literacy, and teacher efficacy interact to facilitate technology integration in classrooms. This research is centered on three main questions: **RQ1**) How does teacher training, technological literacy and teacher self-efficacy independently contribute to the integration of technology in learning?; **RQ2**) How does teacher training partially mediated by technological literacy or teacher efficacy contribute to integrating technology into learning? **RQ3**) How do teacher training, technological literacy and teacher self-efficacy simultaneously contribute to the integration of technology in learning? This research was conducted to represent how teacher training contributes to the integration of technology in learning through the mediation of teacher literacy and self-efficacy, which is then described in the following hypotheses:

H1. There is a direct relationship between the following factors: a) teacher training in the integration of technology in learning; b) teacher technological literacy regarding the integration of technology in learning; and c) teacher efficacy regarding technology integration in learning.

H2. There is an indirect relationship between the following factors: a) teacher training through technological literacy towards the integration of technology in learning; b) teacher technological literacy through self-efficacy regarding technology integration in learning; c) teacher training through self-efficacy regarding technology integration in learning.

H3. There is a simultaneous relationship between teacher training, teacher technological literacy and self-efficacy regarding the integration of technology into learning

METHOD

Participants

The sample of the research is quantified using the Slovin formula (Zamzam, 2018): Based on the formula, a minimum sample to be

$$n = {}^{N}/_{1 + N(d)^2}$$

statistically significant (d=0,05%) is 143 respondents. The research sampled 182 teachers from a total of 222 at SMA GunungKidul's transformation program, who had participated in teacher competency training. Data collection was conducted via a questionnaire using a Likert scale (1-5), from June to August 2023 across six high schools in different sub-districts within Gunung Kidul.

This research employed a quantitative methodology to assess the correlation between teacher training, technological literacy, and teacher self-efficacy, and their collective impact on technology integration in learning environments. The independent variable defined in this research is a teacher competency training program that includes pedagogical-professional and technological (ICT) content, facilitated by the relevant educational authorities. The first pathway variable, technological literacy, encompasses knowledge and skills associated with using and managing technology to access, organize, and communicate information pertinent to learning content. The second pathway variable, teacher self-efficacy, is defined as the teacher's confidence in managing classrooms, engaging students, providing instructional guidance, and employing technology to support learning. The dependent variable, technology integration, involves the application of technology in educational activities that incorporate pedagogical principles and learning content.

Research Design and Procedures

The research design is built in a path pattern (figure 1). Referring to Sugiyono (2023, p.302 &303) the equation of direct and indirect paths is as follows X (e1), Y1= rY2Y1 + e2, Y2= rY2X + rY2Y1 Y1+ e3, Y3= rY3X + rY3Y1 Y1 + rY3Y2 Y2 + e4.

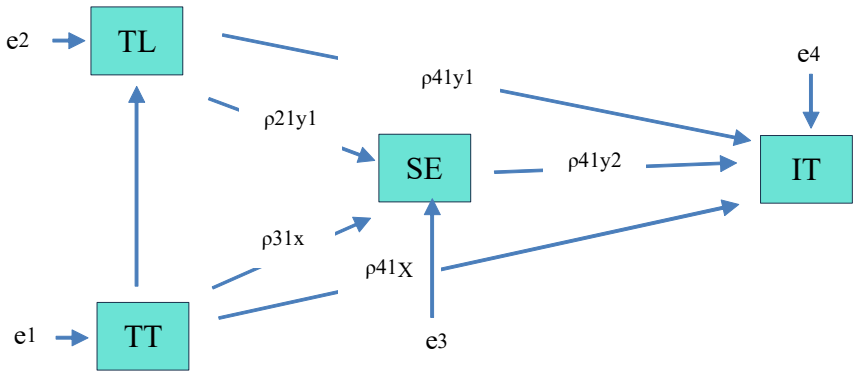

Figure 1. Flowchart

The reconstruction of the relationship model from this research shown in Figure 1 represents the structural equation for the first path in the form of Teacer Training (X/TT) which encourages technological literacy (Y1/TL) directly or indirectly for the application of technology in learning practice (Y2/IT) with the path coefficient p21y1. Furthermore, the second path equation of TT drives teacher efficacy (Y3/SE) directly and indirectly for IT from the path coefficient p31x and path coefficient p21y1 with residual e2. The third equation structure path with TT which is thought to be simultaneous with TL and SE has an impact on IT from the path coefficients p41X, p41x and p41y2 together with residual e4, including TL and SE are thought to have a direct/indirect impact on driving IT.

Instrument

The source of primary data collection is in the form of a questionnaire. It provides a number of structured written questions to respondents regarding their responses to the various variables studied (Muchlis et.al., 2019). Structured questions are constructed and described according to the indicators of each variable. The ranking of choices for respondents starts from level 1 in the strongly agree category to disagree in category 5. The score is given by looking at the nature of the question items.

The questionnaire included various scales for measuring the four main constructs. (1) Training for workers and adaptation to the context of training for teachers which utilize Moses and Mangkunegara model (Letemia, 2018; Karyono and Gunawan 2021) includes training objectives, materials, methods, participant and instructor qualifications, and training duration. (2) Technological Literacy, which refer to Katz andMacklin's (2013) framework consists of seven indicators: defining, accessing, managing, integrating, evaluating, creating, and communicating. Each question item was developed from these points and constructed based on the theory of each variable in this research. (3) Teacher Efficacy is based on the TSES by Moran and Hoy (2001), focusing on student engagement, instructional strategies, classroom management, and an additional indicator by Gao et al. (2020) for technological self-efficacy. (4) Technology Integration is measured through seven indicators of TPACK, encompassing knowledge, content, and technology integration. For the third construct, each question is taken from Tschannen T-Moran and Hoy (2001) and Gao et.al., (2022). For the fourth construct, each question is taken from Destiana et.al. (2021).

Instrument testing at the first level was carried out by educational management experts by UNY Postgraduate Lecturers. Next, from 30 respondents at the SMA Negeri 6 Yogyakarta Transformasional School, testing was carried out via SPSS.24.0. to see a correlation showing a calculated r of at least 0.3. Thus, 40 questions are valid for variable X. 47 questions are valid for variable Y1 and item no. 42 are invalid for variable Y1. 36 questions are valid for Y2 and item no. 36,37 and 38 are not valid for variable Y2. 28 questions are valid for variable Y3 and item no. 16,17,18 are not valid for variable Y3.

Testing the reliability of the instrument uses Cronbach's Alpha formula with an alpha value > 0.80, where there are 40 reliable question items on variable X with an alpha value of 0.970. There are 47 reliable questions on variable Y1 with an alpha value of 0.966. There are 36 questions on the Y2 variable that are reliable with an alpha value of 0.971 and there are 28 questions that are reliable with an alpha value of 0.948.

Data Analysis

The data obtained was tabulated per variable category and a frequency distribution was generated for each variable from the collected data using the formula 1 +3.3 log n and calculation was done to determine the interval for each variable and data range which is generated from the formula nmax -nmin. (Sugiyono, 2023). The results obtained are then made into a table.

Category calculations were conducted based on the mean value and standard deviation. Then the value obtained is calculated using the formula X e" ì+1. ó and it is included in the category range: x < (ì-1.0 ó) which indicates the low category, (ì-1.0 ó) (Akbar and Rachmah, 2015). It is then presented in percent values.

The collected data were then analyzed using SPSS 24.0 for normality (Kolmogorov-Smirnov test), absence of multicollinearity (Variance Inflation Factor test), linearity (ANOVA), and homoscedasticity checks (Glejser test). The values of the four variables show: normal distribution, linear relationship between variables

and no symptoms of heteroscedasticity with the value of each assumption test being significant > 0.05. The variables do not have symptoms of multicollinearity with a Tolerance value > 0.01.

Hypothesis testing is carried out through correlation analysis, namely an attempt to measure the magnitude and direction of the relationship that occurs from the data obtained. The level of strength of the relationship can be seen from the correlation coefficient (r). The correlation coefficient shows the strength of the linear relationship and the direction of the relationship between two random variables. Correlation analysis is seen in the matrix structure of the processed data from the LISLER application. Calculation of the contribution of each variable is based on the correlation matrix using the following formula, KP= r2 X 100%. Guidelines for Interpreting Correlation Coefficients as follows: 0.00 to 0.199 (Very Weak), 0.20 to 0.399 (Weak), 0.40 to 0.599 (Medium), 0.60 to 0.799 (Strong), 0.80 to 1.000 (Very Strong), (Sugiono, 2023).

■ RESULT AND DISCUSSION

The data of this research have fulfilled the prerequisite requirements to be further analyzed, and the categorization of the research data is presented in Table 1.

Table 1. Data categorization

Var	Mean	SD	Prosentase	Level of Category
			10.4%	High
X/TT	157.59	11.9	77.5%	Medium
			12.1%	Low
			14.3%	High
Y1/LT	183.20	6.66	70.9%	Medium
			14.8%	Low
			15.9%	High
Y2/SE	138.45	12.45	70.9%	Medium
			13.2%	Low
			17.6%	High
Y3/IT	104.78	11.42	67.0%	Medium
			15.4%	Low

The categorization of the four variables places them predominantly in the medium range. Within this category, the highest score was recorded for the teacher training (TT) variable at 77.5% with a mean value of 157.59, followed by both technology literacy(TL) and teacher efficacy(SE) at 70.9% with a mean of 183.20 for TL and 138.45 for SE, and Technology integration (TI) at 67.0% with a mean of 104.78.

This data shows that teachers at GunungKidul High School are involved and feel the benefits of the competency training carried out, so this is a positive response to efforts to realize the vision of the driving school program. Khofifah & Samsul (2023) stated that one of the transformational school program policies is to receive intervention from the government in the form of consultative services and asymmetric assistance as well as human resource development, through training activities, coaching from the Ministry of Education and Culture or from selected trainers who are competent in their fields. According to Unesco (2018), understanding ICT in education policy is a

competency that encourages teachers to be aware of how technology can be aligned with national education priorities stated in policy. Teachers are encouraged to understand their role in preparing the next generation to be effective and productive in society. Gómez-García et.al. (2020) argued that teachers need to be trained as agents of innovation for sustainable education, therefore ICT training should be conditioned on: specific teacher attitudes towards technology, exogenous factors that encourage positive teacher perceptions about ICT training including simplicity and usefulness of training methods, flexibility of training programs and personalized training and effective and appropriate technology training for inclusive classes. Khofifah & Samsul (2023) said that with the aim of equalizing education through transformation schools, each educational unit can consult with the ministry and determine the type of training needed to be able to overcome the problems that occur. Hurt (2015) emphasized that human resource development is an important investment in achieving organizational goals and leadership policy initiatives are important in determining training decisions that will determine the intensity and sustainability of training. The results of the competency training data which are in the medium category show that the competency training attended by teachers at the GunungKidul district transformation school is in accordance with the context of the needs faced in the education unit, and in the future the service of training activities can still be improved by taking into account the evaluation in previous activities.

Data on teacher technology literacy (70,9%) in the medium position shows that teachers at Transformation High School in Gunung Kidul district are able to define, understand, identify and use the technological facilities available at the school in the form of software and hardware. According to Asari et. al. (2019), the level of ICT literacy is related to teacher competence in accessing, selecting and understanding, analyzing and verifying. distribute and produce information, participate and collaborate in learning communities. Cadiz-Gabejan & Takenaka (2021) emphasize that literacy is the main need for individual teachers and students in dealing with a rapidly changing global environment in the technological era, because literacy is related to the ability to use technological devices which are always developing and being updated. The concept of ICT literacy in line with the holistic mission of the transformasional school program's objectives, namely seeking to increase knowledge and immediately prioritize the Pancasila character profile, such as improving critical, creative and ethical abilities in using technology. Hidayati et.al (2023) explained that the elements of the Pancasila Profile of driving schools consist of the critical reasoning dimension in the form of elements of analyzing and evaluating reasoning, as well as the creativity dimension in the form of elements of reflecting and evaluating thinking independently.

The teacher efficacy variable (70,9%) is in the medium category, showing the teacher's good self-confidence in carrying out learning management and classroom management as well as using the ICT facilities available at the school. Teacher efficacy enables teachers to manage their knowledge and handle and evaluate students in handling the class with the correct method (Mani & Prabu, 2019). Considering that the rapid development of technology requires special skills, self-efficacy can enable teachers to face these challenges (Dharma et.al., 2020). Bandura (1997) has expressed self-efficacy as self-confidence in completing tasks even though they are difficult. Emotional symptoms/stable stress levels are a manifestation of optimal individual self-efficacy. (Prahara & Budiani, 2019). The relationship between outcome expectation efficacy and self-efficacy can be weakened by the context and the value of the effort a person

makes which will determine the continuity of 'expectation efficacy (EE) and outcome expectation (OE)' to achieve the outcome. Individuals can achieve goals/desires/ achievements (outcomes) because of the efficacy of expectations (EE) which encourage individuals to strive to achieve these desires, and if in reality the achievement outcomes do not materialize or the expected outcomes (OE) do not occur or are not in line with Efficacy expectations, then a person's self-efficacy value will become weak (Probstl & Schmidt, 2019).

The score for the Technology Integration which is at the medium level (67.0%) shows that teachers at the GunungKidul Regency Transfomasi High School are able to use technology in the decision-making process during learning and/or in teaching and instruction activities. According to (Herliani & Wahyudin, 2018) the process of integrating technology in learning can be demonstrated by: (a) output from the teacher in the form of skillfully managing the building blocks of ICT-mediated educational construction to build meaningfulness and comprehensiveness of education for students; (b) Teachers utilize the available infrastructure to realize educational plans and designs which are reflected in learning practices (c) Teachers are capable of carrying out learning assessments aimed at increasing student competency through learning evaluations that are integrated with ICT

The Path data analysis from the equation Y3 = 0.294*Y1 + 0.260*Y2 + 0.293*X, Errorvar = 69.08, R = 0.47, has resprested in table 2.

Table 2. The causal relationship between research variables in the path

Path	**(t sig*> 1.96)**	**r (*D*)**	**r (*In*)**	**r^2**	**Corelation Level**
Direct (*D*)					
X,-Y3	3.942*	0.293		8.6%.	Very Weak
Y1-Y3	4.870*	0.294		8.6%.	Very Weak
Y2-Y3	3.346*	0.260		6.8%.	Very Weak
Indirect (*In*)					
X-Y1-Y3			0.08	0.64%	Very Weak
Y1-Y2-Y3			0.04	0.16%	Very Weak
X-Y2-Y3			0.27	7.29%	Very Weak
Simultaneous	9.49*	0.685		47% (R)	Medium

The Positive coefficients in the three columns in Table 2 summarized in Figure 2 confirm the validity of the three hypotheses: direct partial relationship, indirect relationship, and simultaneous relationship, each showing significance although with varying levels of strength.

The partial direct and indirect relationships fall into the very weak category, while the simultaneous relationship registers in the medium category. This observation aligns with Sugiyono's statements (2023, p. 308) in which he posits that within a path model approach, even with a small regression coefficient indicative of a weak

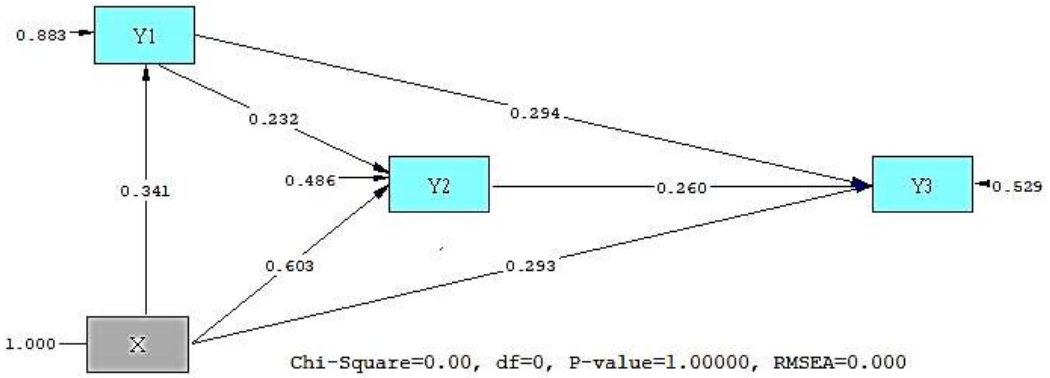

Figure 2. Path coefficient

correlation, significant relationships between variables can still be detected with a sufficiently large sample size—in this study, 182 out of 222 teachers.

Al-Kassem (2021) notes that skills development and training meet organizational HR qualifications and enhance work efficiency and productivity. Continuous training is the main approach that motivates individuals to become more trained and competent to be productive in the technological era (Olaro-Posiar, 2016). Teacher human resource training can build cognitive aspects, psychomotor and affective activities of teachers which increase teacher understanding, adaptability and innovation skills, as well as teachers' participatory attitudes in learning activities. (Guskey 2000). Referring to the findings, training contributed positively to technology integration directly 8.6% and also indirectly through technological literacy 0.64%. The competency dimension consists of knowledge and skills, where knowledge refers to a previous understanding regarding different circumstances and skill means the ability to use knowledge consciously and even unconsciously and practically in the operational contexts. (Keshavarz, 2020. p.84). More advanced levels of technology literacy are teacher competencies in accessing, selecting and understanding, analyzing and verifying. distribute and produce information, participate and collaborate in learning communities (Asari et. al. 2019). Further supporting this view, Walidin (2016) and Haryono et al. (2017) highlighted a direct link between KKG education and training and teacher performance in active, innovative learning using technology. In Greece, ICT training initiatives for teachers have shown significant results across various indicators of ICT usage in classrooms (Kollia et.al., 2019). Mahapatra's (2020) research in India found that teachers involved in digital technology training demonstrate enhanced ICT integration skills, facilitating efficient teaching. Studies for teachers who took part in continuous training present a positive and very significant correlation in the form of: a) ability to guide students with an effective approach to learning, b) effectiveness in using special platforms and software for teaching mathematics; c) ability to utilize technology independently with methodological, strategic and selective applications to filter, compile and share learning content so as to improve student learning (Gómez-García, et.al. 2020).

This research data also reveals that technological literacy has a direct effect on the integration of technology in learning at 8.6%. Sabatini et.al (2019) stated that technological literacy is the perceptual, motor and cognitive part of how the human brain works to be used in

procedural code language in automatic digital device applications. According to Kennedy-Clark & Reimann (2021), excellent teacher technology literacy will maximize data-based teacher decision-making processes that are in line with pedagogical standards, assessment standards, classroom management standards and teacher professional development standards. In Hafifah & Tulisiyo's (2020 p.190) research, they found a significant correlation (P-0.00) between lecturers' ICT literacy and the frequency of ICT use activities in learning. Research by Julien et.al (2020) shows that aspects of digital literacy are factors that encourage the strength of skills, knowledge and attitudes needed by individuals to access digital information effectively, efficiently and ethically. A research report in Changchun China on teacher data literacy in elementary to middle schools with the TPACK indicator shows that teachers teaching grades 4-6 with high data literacy skills have positive performance implications (Cui & Zhang, 2022).

The competence and cognitive processes possessed by teachers will be a link between self-efficacy and individual confidence in using their metacognitive strategy abilities for a more productive performance process (Keshavarz, 2020). That opinion supports the contribution of technological literacy through indirect teacher efficacy of 0.16% for teachers to integrate technology in learning at transformational high schools. *"Self-efficacy perceptions are developed based on individuals' competencies for performing specific activities. Selfefficacy is not just associated with the competency, but also it denotes one's judgment about his abilities concerning his competency"*. (Keshavarz, 2020 p.85). A research of 'blended learning' activities in the Philippines revealed that teacher digital literacy had a significant positive correlation with teacher self-efficacy in applying technology, where teachers with high digital literacy skills would increase self-efficacy in integrating technology (Garzon & Garzon, 2023).

Training also becomes main driver influencing teacher capacity in the light of self efficacy, leadership, motivation, self confidence, and utilisation of technology. It was revealed from this research that there was an indirect relationship between training and technology integration through teacher efficacy of 7.29% in integrating technology. Indications of the relationship between humans and technology are shown by individuals' acceptance behaviour and perceptions regarding the use of technology as well as intentions to use it (Mohamad et.al., 2017, Dharma et.al., 2020). In line with a research on ICT training from Jose et.al., (2022) which provides an increase in the enjoyment and self-efficacy scores of mathematics teaching teachers so that they are more enthusiastic about using ICT in learning. Tome et al. (2020) found that training fosters positive interactions among several variables—self-efficacy, teacher leadership, motivation, problem management, and mental health literacy—improving teachers' problem-solving capabilities with an R-value of 20.9%.

Teachers' self-efficacy can increase if their personal values and work environment attributes are considered compatible with their desires (Djigic & Caplan in Barni, Danioni & Benevene, 2019). Self-efficacy is a direct antecedent to teachers' attitudes towards committing to integrating technology (Hagger, et.al., 2022). From this research, teacher efficacy directly provides a positive contribution of 6.8% for teachers to apply technology in learning. Research in Sweden also shows that strong teacher self-efficacy enables teachers to manage data information, communicate and collaborate in teaching practices (Mannila et.al., 2018). Bandura (1997) pointed out that the training experience as a driver of self-efficacy was expressed through positive thoughts from

individual struggles and learning in the past (Mastery Experience), and through the learner's observation of the experiences and performance of other people (Vicorous Experience) who are competent. Knowles (1975) stated that through 'learning', the psychological needs of adults can be met and experience from this phase of life can be used to learn, and immediately apply the knowledge gained. Furthermore, the self-efficacy that teachers have due to sufficient knowledge and skills encourages teachers to become more confident and decide to integrate ICT in learning. "Self-efficacy reflects cognitive capacities and underlying skills, it also incorporates affective components such as confidence, motivation and willingness to innovate" (Bandura, 1997)

In this way, teacher training at Gunung Kidul Transformational High School can encourage teacher technological literacy and teacher efficacy in integrating technology in every lesson, which can be seen from the simultaneous contribution value of exogenous variables of 47%. Another research with a similar concept was conducted by Gutara, et.al., (2020) which showed that the training variable had a positive and significant influence on teacher performance, and through training, work motivation and professional competence simultaneously had a significant influence on teacher performance with the influence of these three variables is 70% of the R value or coefficient of determination of 0.70. Lastly, studies by Rofi'I et.al., (2023) demonstrate the impact of training on English teachers' self-confidence and their capacity to utilize and innovate with technology in educational settings.

CONCLUSION

The research at Gunungkidul Transforma tional High School revealed a direct correlation between training and technological literacy, as well as teacher efficacy in technology integration. This underscores the pivotal role of teacher human resource training in significantly enhancing cognitive abilities and fostering teacher efficacy and confidence in utilizing technology within teaching practices. Moreover, a partial direct relationship was observed between the dependent variable and several independent variables, including training in technological literacy, training in teacher efficacy, technological literacy in technology integration, and efficacy in technology integration within learning environments. Furthermore, an indirect relationship was identified between training, technological literacy, and teacher efficacy towards technology integration, highlighting a unidirectional connection. Consequently, it is crucial for schools to recognize and address the correlations among the exogenous variables and intermediate variables identified in this research to optimize the effectiveness of technology utilization in teaching and learning activities. Future investigations should delve into additional factors such as infrastructure and technological support, curriculum design, and school leadership, as these variables may also influence the integration of technology in educational settings. This research is limited to the number of respondents who are willing to provide information, a total of 182 teachers which should be taken from 222 teachers, as a population in GunungKidul transformational high schools.

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