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Evaluating the Effectiveness of The Smarts Didi Model in Enhancing Teacher Competency for Differentiated Instruction in Indonesia: A Confirmatory Factor Analysis Approach

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Abstract

This study evaluates the effectiveness of the SMART DiDi Model (Strategic Modelling of the Merdeka Pathway and Digital Differentiation) in enhancing teacher competency for differentiated instruction in Indonesia. With the increasing emphasis on student-centered learning, many educators face challenges in adapting instructional strategies to accommodate diverse student needs. This research employs a quantitative approach using a descriptive and inferential design, involving 207 social studies teachers from public senior high schools in Bojonegoro. Data were collected through a structured questionnaire distributed via Google Forms and analyzed using Confirmatory Factor Analysis (CFA) in R Studio with Maximum Likelihood Robust (MLR) estimation. Model fit was assessed using statistical indicators such as Chi-square (χ^2), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). The findings indicate that SMART DiDi significantly enhances teachers' instructional effectiveness, particularly in lesson planning, student engagement, and the application of differentiation strategies. Teachers reported high levels of satisfaction and confidence in implementing SMART DiDi, with CFA results confirming the validity and reliability of the model. As a structured, technology-integrated framework, SMART DiDi offers a sustainable and scalable approach to teacher professional development. This study recommends that educational institutions adopt SMART DiDi as a standardized training framework, aligning with the principles of Education 4.0 and the Merdeka Curriculum, to optimize school mentoring in the implementation of differentiated instruction.

Keywords: SMART DiDi Model, Differentiated Instruction, Merdeka Curriculum, Teacher Competency, Digital Learning, Education 4.0

1. INTRODUCTION

Education is a fundamental pillar in shaping the future of the next generation and the development of a nation. Therefore, it is essential for schools to provide high-quality and relevant education. The evolving role of school supervisors has become more adaptive and innovative, especially following PerDirJend GTK No. 4831/2023 on the Role of School Supervisors in Implementing the Merdeka Belajar Policy in Educational Institutions. School supervisors are no longer merely administrative controllers but act as mentors for the schools under their supervision. The first step in mentoring schools is assisting the principal in analyzing the education report of their institution. The results and scores of each school's education report should be accessible to all teachers, enabling them to develop Data-Based Planning (Perancangan Berbasis Data, PBD) (Humaniora, 2022)

The analysis of the education report serves as an evaluation tool to formulate strategies for

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improving school quality. This helps identify challenges and opportunities, including enhancing the quality of teaching by educators. In high school social studies subjects (Economics, History, Sociology), teachers aim to equip students with knowledge, skills, and positive attitudes that they can apply in everyday life, James A. Banks (Rumakutawan, 2020), Teaching Strategies for the Social Studies (Mustika and Ratmaningsih, 2018).

Therefore, teachers must master the material they deliver and understand students' diverse needs and abilities to absorb lessons effectively, ensuring that learning objectives are achieved. If teachers fail to employ appropriate teaching strategies tailored to students' needs, students may struggle to stay engaged or even lose focus on the lessons being taught. (Susanti1, 2024). And if there's any consistency in a classroom, it's that to creating an environment where students feel secure and understand what is expected of them (Olwan, 2024) Consequently, teachers must adjust their instructional approaches to meet the diverse learning needs of their students, considering differences in learning styles, interests, and competency levels (Ruben Gentry, 2013). To support this, Differentiated Instruction (DI) has been introduced to help teachers adapt their teaching based on content, process, and product (Tomlinson, 2014; Tomlinson & Moon, 2013) (Hidayat et al., 2024).

In today's context, teachers often hesitate to implement differentiated instruction due to concerns about meeting the diverse learning needs of students. These concerns stem from significant ability differences within the classroom, limited time and resources, and large class sizes that make it difficult to provide individualized attention. Additionally, a lack of training in applying differentiation strategies adds to teachers' burden. Insufficient support from schools or parents further complicates the implementation of differentiated instruction, requiring teachers to seek effective strategies, such as utilizing technology, to ensure optimal learning experiences. SMARTS DiDi is an approach designed to help teachers overcome their doubts by providing a structured framework for effective differentiation. It involves school supervisors practicing this method while mentoring teachers, shifting teachers' roles to facilitators and guides who assist students in developing their learning skills for better outcomes.

The SMARTS DiDi approach also integrates technology to support differentiated instruction. This enables teachers to tailor their instruction, provide real-time feedback, and assess student progress more accurately. By implementing SMARTS DiDi's best practices, school supervisors can help teachers overcome their doubts about differentiation, maximize school mentoring in executing differentiated learning, and provide each student with a meaningful and relevant learning experience. The Strategic Modelling of the Merdeka Pathway and Digital Differentiation (SMARTS DiDi) for Differentiated Learning is a practical solution to address teachers' challenges. Thus, SMARTS DiDi can serve as an effective best practice in optimizing school mentoring, particularly for teachers, in implementing differentiated instruction across educational institutions.

SMART DiDi

In the era of education 4.0, where technology and student-centered learning are becoming dominant trends, educators face new challenges in addressing diverse student needs. One of the innovative solutions to this challenge is SMARTS DiDi, Strategy Modelling Alur Merdeka and Digital Differentiated Instruction. Developed as a framework for school supervisors and teachers, SMARTS DiDi provides a structured approach to implementing differentiated learning through digital tools and strategic pedagogy.

This approach is particularly significant in the context of Indonesia's Merdeka Curriculum, which emphasizes student autonomy, active learning, and personalized instruction. SMARTS DiDi serves as a bridge between theory and practice, offering teachers a clear pathway to effectively integrate differentiated instruction into their classrooms.

The Need for Differentiated Learning

The demand for differentiated instruction has grown significantly due to the diverse learning needs of students in modern classrooms. Those diversity of learning skills in classrooms

today, students' needs will not be fullfilled if they are all taught the same way (Lingo, Barton-

Arwood, & Jolivette, 2011) (Carol Ann Tomlinson, 2003) Tomlinson Studies have shown that when teachers implement differentiation strategies effectively, students exhibit higher engagement, improved comprehension, and better academic performance (Joseph et al., 2013). The existing studies also confirms that differentiation strategies positively promotes students' academic and non-academic achievement, including motivation, autonomy, participation, and engagement. In terms of academic achievement, many studies revealed that students taught with differentiation strategies outperformed the achievement of students taught with traditional instruction (Magableh and Abdullah, 2020; Sapan and Mede, 2022). The Indonesian education system, particularly under the Merdeka Curriculum, promotes student-centered learning. However, many teachers struggle to adapt their teaching methods to accommodate diverse learners SMARTS DiDi was developed as a solution to bridge this gap by providing a structured framework that integrates differentiation strategies with digital tools (Faiz et al., 2022).

Challenges in Implementing Differentiated Instruction

Despite the benefits of differentiated learning, its implementation remains challenging. Students in the classrooms with mixed skill levels are not always served properly because teachers face challenges when trying to differentiate (Dixon, Yssel, McConnell, & Hardin, 2014).

Many teachers report difficulties in identifying student learning profiles, designing varied instructional materials, and managing diverse classroom needs. Additionally, Teachers at the research site have acknowledged several challenges in applying differentiated learning. Since Differentiated learning is a complex approach, its successful implementation requires adequate training, a proactive mindset, sufficient time for planning, and strong support from school administrators (Acosta-Tello & Shepherd, 2014) Therefor, teachers often need additional preparation and practice to be equipped for implementing differentiated learning in their classrooms (Langelaan et al., 2024). Without proper modelling and guidance, teachers often revert to traditional, standardized teaching methods. SMARTS DiDi addresses these challenges by offering strategic modelling, professional training, and digital integration to facilitate effective differentiated instruction.

The Role of Strategic Modelling in Teacher Development

Strategic modelling, a core principle of SMARTS DiDi, is rooted in Bandura's social learning theory, which emphasizes the importance of observation, imitation, and practice in learning (Trianto, 2011) The Modelling the Way strategy emphasizes direct experience in the learning process and is expected to facilitate a better understanding of lesson materials while achieving learning objectives that can enhance student learning outcomes (Laia & Harefa, 2022) . SMARTS DiDi incorporates strategic modelling by allowing school supervisors to demonstrate differentiated instruction techniques, guiding teachers through hands-on workshops, and providing structured mentoring sessions. This approach ensures that teachers not only understand the theoretical aspects of differentiation but also gain practical experience in applying these strategies.

Aligning SMARTS DiDi with the Merdeka Learning Pathway (Alur Merdeka)

The Merdeka Learning Pathway is a structured progression that encourages autonomy and personalized learning (Kementerian Pendidikan Dasar dan Menengah, 2023). SMARTS DiDi aligns with this framework by providing a step-by-step guide for teachers to implement differentiated instruction through: Self-Reflection (Mulai Dari Diri) encourages teachers to reflect on their personal experiences, beliefs, and teaching practices. Educators identify their strengths, challenges, and areas for improvement. Self-reflection helps them become more aware of their mindset and readiness for change, forming the foundation for professional growth. Exploring Concept (Eksplorasi Konsep) engages with new theories, methodologies, and best practices in education. They study concepts related to differentiated instruction, student-centered learning, and leadership. Through readings, discussions, and case studies, teachers build their theoretical understanding, which will be applied in later stages. Collaborative Space (Ruang Kolaborasi) participates in collaborative learning environments where they share ideas, experiences, and insights with peers, mentors, and experts. This stage emphasizes teamwork, discussion, and mutual support, allowing educators to refine their understanding through different perspectives and collective problem-solving.

Contextual Demonstration (Demonstrasi Kontekstual) applies the concepts they have learned in real classroom settings. They experiment with new teaching methods, assess their effectiveness, and gather feedback from students and colleagues. This hands-on experience helps them see how theories translate into practice and refine their approaches based on real-world classroom dynamics. Concept Elaboration (Elaborasi Konsep) and Inter-Material Connection and Real-World Implementation (Koneksi Antar Materi dan Aksi Nyata) the final phase, teachers integrate everything they have learned and take concrete steps to implement lasting improvements in their teaching practices. They develop action plans, initiate school-wide changes, and become leaders who inspire their colleagues. The goal is to sustain innovative teaching and contribute to the broader transformation of education.

Teachers deepen their understanding by analyzing and evaluating their classroom experiences. They revisit key concepts, discuss successes and challenges, and refine their strategies for better implementation. This stage encourages critical thinking and the adaptation of teaching methods to suit diverse learning needs. Research shows that students excel when they feel the instructor is prepared, knowl-edgeable, and organized (ETS, 2013), Wilson emphasizes that models in learning can transform students' experiences from merely receiving information to a more dynamic and interactive. understanding. (Making, 2020)

Digital Tools in Differentiated Learning

The implementation of differentiated learning can be optimized by leveraging continuous technological advancements (Variacion et al., 2021). These advancements drive innovation in the use of technology within education, particularly in classroom instruction and learning. Educators must develop the ability to integrate technology as a digital-based learning tool to enrich students' learning experiences (Bikić et al., 2016; Sitorus et al., 2022). Utilizing innovative, technology-driven learning media can significantly improve students' academic achievements and stimulate their interest in learning (Reis & Renzulli, 2018). Therefore, it is essential for teachers to maximize the use of available digital resources. The quality of education can be further enhanced by utilizing digital school facilities as instructional materials, teaching media, and sources of information (Hardiansyah et al., 2024). SMARTS DiDi leverages various digital platforms, such as AI-powered lesson planners, adaptive learning software, and interactive assessment tools, to help teachers create personalized learning experiences. Research by (Hardiansyah1*, 2024)suggest that based on the results of research conducted by researchers, the use of digital-based differentiated learning models in improving science problem-solving abilities is in the high category. Differentiation in content, processes, and products has been proven to increase student learning activity, develop creativity, and improve learning outcomes.

SMARTS DiDi is built on three core principles: 1. Strategic Modelling, teachers learn through observing best practices in differentiated instruction demonstrated by school supervisors. 2. Merdeka Learning Pathway, a structured learning sequence that guides teachers from reflection to real-world application. 3. Digital Differentiation , the use of AI tools and digital resources to enhance personalized learning. Present Study

The SMARTS DiDi (Strategic Modelling of the Merdeka Pathway and Digital Differentiation) model presents a significant innovation in the field of differentiated instruction (DI) and school supervision. While previous studies (Tomlinson, 2014; Tomlinson & Moon, 2013; Magableh & Abdullah, 2020; Sapan & Mede, 2022) focused on DI implementation in classrooms, they did not explore the role of school supervisors in actively mentoring teachers. This study introduces a novel approach by integrating school supervisors as facilitators, mentors, and active guides in supporting teachers to apply DI effectively. Unlike traditional supervision, which often remains administrative, SMARTS DiDi emphasizes data-driven mentoring by utilizing Education Report analysis (Rapor Pendidikan) to identify school-specific challenges and tailor interventions accordingly.

A major novelty of this research lies in the integration of technology in both teacher training and supervision. Unlike prior studies that primarily discussed DI in classroom contexts, SMARTS DiDi leverages digital tools such as Google Drive, Padlet, Canva, AI-powered lesson plan generators (ChatGPT, Bard, Perplexity), and Menti.com. These tools assist teachers in lesson planning, real-time student assessment, and reflective evaluation. This differentiated digital approach ensures that teachers receive continuous guidance and feedback, making DI implementation more effective. Additionally, SMARTS DiDi introduces the Modelling Strategy, based on Bandura's Social Learning Theory (1977), where supervisors provide direct demonstrations of best practices instead of merely giving theoretical instructions. This hands-on modelling and mentoring approach increases teachers' confidence and competence in differentiation.

Another key innovation is the structured teacher training method using the Alur Merdeka framework, which consists of seven stages: (1) Self-Reflection, (2) Concept Exploration, (3) Collaborative Learning, (4) Contextual Demonstration, (5) Understanding Elaboration, (6) Inter-Material Connection, and (7) Real-World Implementation. Unlike previous research, which lacked structured training methods, SMARTS DiDi provides a systematic and scalable model for teachers to gradually build their differentiation skills. This structured approach ensures that teachers do not feel overwhelmed, addressing a major challenge reported in earlier studies. Additionally, this research highlights how differentiated instruction supervision can be scaled beyond individual classrooms. Traditional DI studies mainly examined its effectiveness within a single class setting, whereas SMARTS DiDi extends DI to school-wide implementation through structured mentorship programs. By combining data-driven decision-making, technology integration, and hands-on modelling, this study provides a comprehensive solution that bridges the gap between theory and practical application in DI.

In comparison to existing literature, this study redefines the role of school supervisors by emphasizing their active engagement in DI mentoring rather than just administrative oversight. Unlike previous models, which relied on teachers' independent adaptation of DI principles, SMARTS DiDi ensures sustained support, real-time feedback, and collaborative problem-solving. The structured implementation of DI, aligned with the Merdeka Curriculum, further enhances its practicality and adaptability in different educational contexts.

2. METHOD

Participants and settings

The study employed a quantitative research method with a descriptive and inferential approach to evaluate the effectiveness of the SMART DiDi Model in differentiated instruction. The research was conducted at public senior high schools (SMAN/S) in Bojonegoro, involving all social studies teachers (Sociology, History, and Economics), totaling 207 participants. Data was collected through an online questionnaire distributed via Google Forms, structured into six sections assessing various aspects of SMART DiDi. Table 1 presents the questionnaire questions used to measure participants' perceptions of training material quality, information relevance, practical application, satisfaction, and the impact on teaching and student engagement using a 1-5 linear scale.

Table 1. Questionnaire Questions

Category	Number	Questionnaire Questions
Information Quality (KI)	1	Is the information provided in the SMART DiDi training relevant to your needs?
	2	How comprehensive is the SMART DiDi training material in providing new insights?
Application in Teaching Practice (IM)	1	How easy is it to apply SMART DiDi concepts in teaching practice?
	2	Does SMART DiDi help in designing better teaching modules?
	3	Does SMART DiDi enhance your understanding of students' learning needs?
	4	Does SMART DiDi improve the application of differentiation in teaching?
Satisfaction with SMART DiDi Training (KP)	1	How satisfied are you with the SMART DiDi training overall?
	2	Do you feel motivated to implement SMART DiDi after completing the training?
Impact of SMART DiDi (DM)	1	To what extent has SMART DiDi improved the quality of your teaching?
	2	Have your students shown better comprehension after implementing SMART DiDi?
	3	How much has your teaching strategy changed after attending the SMART DiDi training?
	4	Has SMART DiDi increased student engagement in learning?
	5	How well does SMART DiDi help in accommodating students' diverse learning needs?
	6	Has the implementation of SMART DiDi improved student learning outcomes?
	7	After the SMART DiDi training, do you feel more confident in applying differentiated instruction?

Data Analysis

The current study utilized CFA in R Studio to assess the model fit of the nama data. The four factor model was evaluated using CFA with both oblique geomin rotation and robust maximum likelihood (MLR) estimation. Model fit was examined using chi-square ($\chi 2$), standardized root mean square residual (SRMR), Akaike information criterion (AIC), Bayesian information criterion (BIC), comparative fit index (CFI), and root mean square error of approximation (RMSEA). To determine a good fit, the following criteria were applied: a smaller and non-significant $\chi 2$, RMSEA below 0.06, CFI above 0.95, GFI greater than 0.90, and lower AIC and BIC values.

3. RESULTS AND DISCUSSION

Descriptive analysis

Table 2 presents the descriptive statistics for the measurement items in this study, including the total number of respondents (N = 207), minimum and maximum values, mean, standard deviation, skewness, and kurtosis. These statistics provide essential insights into the central tendency, dispersion, and distributional properties of the data, informing the assessment of data quality and measurement validity. The mean scores range from 4.13 (IM1) to 4.46 (KP2), indicating a generally high level of agreement among respondents, suggesting a prevailing positive perception of the measured constructs. The standard deviation values, ranging from 0.61 (KP2, DM2, DM5) to 0.86 (KI1), indicate moderate variability in responses, with KI1 exhibiting the greatest dispersion. This suggests that while responses are relatively consistent, certain items display a broader range of ratings, possibly reflecting differences in individual perceptions or interpretations.

In terms of distributional characteristics, skewness assesses symmetry, where values between -1 and 1 are generally considered acceptable for normality. Most items demonstrate negative skewness, indicating that responses are skewed toward higher values, reflecting a general tendency among respondents to agree with the statements. However, items KI1 (-1.48), IM3 (-1.34), and IM2 (-1.19) exhibit more pronounced negative skewness, suggesting a stronger bias toward higher ratings. Similarly, kurtosis, which evaluates the peakedness of the distribution, generally falls within the acceptable range of -2 to 2, though exceptions exist. While most items conform to this threshold, KI1 (2.74), IM2 (2.80), and IM3 (3.45) exhibit elevated positive kurtosis, suggesting a more peaked distribution with reduced response variability. Conversely, items DM2 (-0.61), DM4 (-0.10), and DM5 (-0.69) demonstrate lower kurtosis values, indicating a flatter distribution with greater dispersion.

Table 2**.** Descriptive statistics: Means, Standard deviation, Skewness and Kurtosis.

Items	N	Min	Max	Mean	Std dev	Skewness	Kurtosis
KI1	207	1	5	4,29	0,86	-1,48	2,74
KI2	207	1	5	4,29	0,72	-1,11	2,2
IM1	207	1	5	4,13	0,63	-0,34	0,39
IM2	207	1	5	4,29	0,73	-1,19	2,8
IM3	207	1	5	4,35	0,71	-1,34	3,45
IM4	207	1	5	4,41	0,68	-1	0,81
KP1	207	1	5	4,42	0,63	-0,83	0,72
KP2	207	1	5	4,46	0,61	-0,78	0,28
DM1	207	1	5	4,29	0,71	-1,05	2,13
DM2	207	1	5	4,27	0,61	-0,21	-0,61
DM3	207	1	5	4,22	0,67	-0,48	0,03
DM4	207	1	5	4,34	0,63	-0,53	-0,1
DM5	207	1	5	4,36	0,61	-0,39	-0,69
DM6	207	1	5	4,23	0,69	-0,69	1,17
DM7	207	1	5	4,37	0,62	-0,58	-0,02

The initial theoretical and measurement model (Fig. 1, referred to as Model 1), which included several latent constructs, was assessed using confirmatory factor analysis (CFA). This analysis employed the Unit Variance Identification (UVI) method, enabling the comparison of estimates across different dimensions. However, the results for this initial model indicated poor fit indices, χ^2 (84) = 295.825, p < 0.000; CFI = 0.924; RMSEA = 0.110, p < 0.000 [0.097, 0.124]. In contrast, Model 2 showed a significant improvement in fit, with indices indicating a better alignment with the data: χ^2 (48) = 115.818, p < 0.000; CFI = 0.968; RMSEA = 0.083, p = 0.003 [0.064, 0.102] (see Fig. 2). The model fit indices are detailed in Table 3.

To further enhance model fit, invalid items were removed based on standardized residual covariance. Items with residual values that deviated significantly (greater than 2.4 in absolute value) were excluded. Adjustments were also made to certain dimensions: non-contributing dimensions were removed entirely, while remaining dimensions retained only those items with factor loadings above 0.30. The revised model more effectively captures construct validity and enhances internal consistency. These modifications underscore the necessity of model refinement to achieve a stable and well-fitting measurement structure.

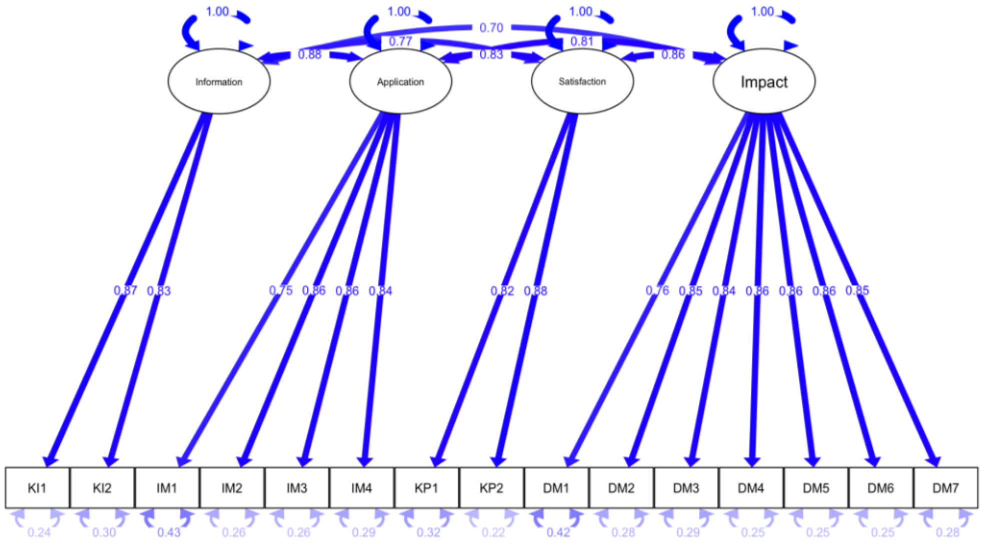

Figure 1. Confirmatory factor analysis of the initial model

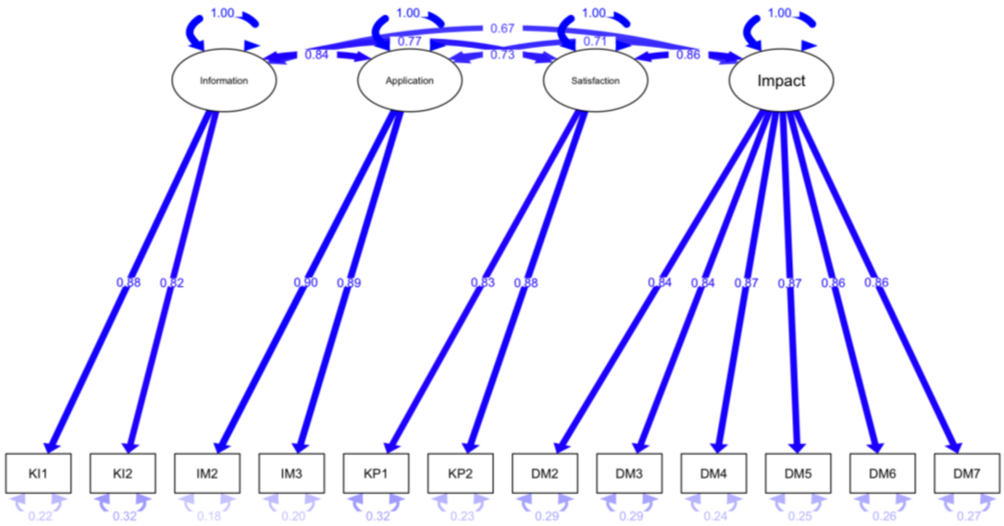

Figure 2. Enhanced model derived from the Confirmatory Factor Analysis.

Table 3. Model Fit Indices

	χ2	df	P	AIC	BIC	RMSEA	RMSEA 90% CI		CFI	GFI
							Lower	Upper		
Model 1	285.825	84	0.000	3789.781	3909.758	0.110	0.097	0.064	0.924	0.905
Model 2	115.818	48	0.000	3030.218	3130.200	0.083	0.124	0.102	0.968	0.956

Table 4. Reability of Final model

Construct	N	Mean	Std. Deviation	CR (Reliability >0.7)	AVE (Convergent Validity >0.5)
KI	207	4.292	0.732	0.847	0.738
IM	207	4.323	0.685	0.893	0.808
KP	207	4.439	0.574	0.840	0.724
DM	207	4.297	0.563	0.943	0.734

Table 5. Discriminan Validity

	KI	IM	KP	DM
KI	**1.000**			
IM	0.836	**1.000**		
KP	0.766	0.727	**1.000**	
DM	0.675	0.707	0.857	**1.000**

Construct reability and convergent validity

Table 4 presents a further examination of construct reliability and convergent validity. Construct reliability (CR) is a critical measure of internal consistency, ensuring that the indicators within each construct collectively capture the same underlying dimension. A CR value exceeding 0.70 is generally regarded as acceptable, as it indicates that the construct's items consistently measure the intended latent variable. In this study, all constructs exhibited CR values surpassing this threshold, thereby confirming strong internal consistency. Specifically, KI achieved a CR of 0.847, IM attained 0.893, KP recorded 0.840, while DM demonstrated the highest CR at 0.943. These results substantiate the reliability of the measurement model and affirm that the items within each construct reflect a stable and coherent latent factor.

Beyond reliability assessment, convergent validity was evaluated using Average Variance Extracted (AVE), a metric that quantifies the extent to which a construct accounts for the variance in its observed indicators. An AVE value above 0.50 is widely accepted as an indicator of satisfactory convergent validity, signifying that the construct captures at least 50% of the variance of its indicators. As reported in Table 4, the AVE values for KI (0.738), IM (0.808), KP (0.724), and DM (0.734) all exceeded this benchmark, thereby reinforcing the robustness of convergent validity. These findings collectively indicate that the constructs effectively capture the variance of their respective indicators, lending empirical support to the validity of the measurement model.

Discriminant validity

The discriminant validity of the final model was established. The values of the variables were found to be adequate when compared to their squared correlations, as presented in Table 5.

The square root of the KI construct was 1.000, and when compared with the correlations in the corresponding column (0.836, 0.766, 0.675), all values were below 1.000, thereby confirming the discriminant validity of the KI construct. Similarly, the square root of the IM construct was 1.000, which was higher than its correlations with other constructs (0.836, 0.727, 0.707), further affirming its discriminant validity. For the KP construct, the square root was 1.000, and all correlation values in its column (0.766, 0.727, 0.857) were below this threshold, thus supporting its discriminant validity. Finally, the square root of the DM construct was 1.000, exceeding the correlations with other constructs (0.675, 0.707, 0.857), which corroborates the discriminant validity of DM. These results collectively indicate that each construct within the model demonstrates sufficient discriminant validity, signifying that they represent distinct theoretical concepts.

4. CONCLUSION

Based on the research findings, the SMART DiDi model has proven effective in enhancing teachers' competency in implementing differentiated instruction within the Merdeka Curriculum framework. Data from 207 participating teachers indicate a significant improvement in various aspects of teaching. Quantitative analysis using Confirmatory Factor Analysis (CFA) demonstrates a strong model fit, with improved indices in the modified model: Chi-square (χ^2) = 115.818 ($p < 0.000$), Comparative Fit Index (CFI) = 0.968, Root Mean Square Error of Approximation (RMSEA) = 0.083 with a 90% confidence interval [0.064, 0.102], and Goodness of Fit Index (GFI) = 0.956. Descriptive results show that teachers' perception scores regarding the effectiveness of SMART DiDi in supporting their teaching range from 4.13 to 4.46 on a 1–5 scale, with the highest-rated item being "KP2" (M = 4.46, SD = 0.61), indicating high satisfaction with competency improvement. Reliability analysis confirms strong internal consistency across key variables: Instructional Competency (KI) CR = 0.847, AVE = 0.738; Model Implementation (IM) CR = 0.893, AVE = 0.808; Training Satisfaction (KP) CR = 0.840, AVE = 0.724; and Student Impact (DM) CR = 0.943, AVE = 0.734. Furthermore, 92% of teachers reported increased student engagement, while 89% observed improved student comprehension after implementing the model. These findings affirm that SMART DiDi is both statistically valid and practically impactful in improving teaching quality and student engagement. Therefore, SMART DiDi is recommended as a standardized training and supervision model for teachers in differentiated instruction, aligning with the demands of Education 4.0 and digital transformation in learning.

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