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Analysis of Teachers' Understanding of the Flipped Classroom Model and its Implementation in Schools through The Rasch Model Approach

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Abstrak

The integration of technology in education has become increasingly essential for enhancing the quality of learning in the digital era. One innovative instructional model that has gained significant attention is the Flipped Classroom, in which active learning occurs outside the classroom through videos, readings, or other preparatory activities, while face-to-face class time is dedicated to discussion, problem-solving, and practical application of knowledge. Despite its potential, the implementation of this model often faces several challenges, particularly regarding teachers' readiness, availability of infrastructure, and their technological competencies. In Makassar City, limited empirical studies have been conducted to examine the level of teachers' understanding of the Flipped Classroom and the obstacles they experience in applying it in schools. Insufficient comprehension of the model among teachers may reduce its effectiveness and, consequently, negatively impact the overall quality of technology-based learning. Understanding these challenges is therefore critical to inform professional development, curriculum planning, and institutional support strategies. This study aims to analyze teachers' knowledge of the Flipped Classroom model and identify key implementation barriers, providing an empirical foundation to optimize technology-driven instructional practices in secondary education.

Kata Kunci: *Flipped, Classroom, Teacher, Understanding, Rasch Model, Technology-Based Learning*

Introduction

Learning applied in the 21st century demands learning that is centered on students. The goal to be achieved is not that they are expected to understand the extent of technological developments, especially in the world of computers. Teaching and learning activities are interrelated systems, the system consists of: teachers, students, and media used in learning. These components are interconnected with each other to produce a goal to be achieved in learning. Increasing student learning outcomes is one form of educational success. The Flipped Classroom learning model is an innovation in the world of education that can increase the effectiveness of learning by reversing traditional patterns. One of the metropolitan cities in eastern Indonesia, Makassar City has quite complex educational dynamics. This city has various schools with varying levels of facilities, from schools that are already digital-based to schools that still use conventional learning methods. With increasingly rapid technological advances and increasingly widespread internet access, the implementation of the flipped classroom model is relevant to improving the quality of learning in schools in Makassar (Kemendikbud. 2020).

When students go home with homework, some of them have well-educated parents who can help with their homework, while others have parents who do not have the knowledge to

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help with their homework. In addition, there are many complaints from students. When in class, the teacher delivers the material too quickly so that students do not have time to take notes on the teacher's explanation, so this makes it difficult for students to do their homework. There are even those who have difficulty understanding the notes they have made themselves during class. Flipped Classroom can overcome the problem of diverse student needs and allow teachers to carry out student-oriented teaching, by providing opportunities and freedom for students to learn independently while at home. The classroom, which shifts learning from the traditional teacher-centered model to student-centered, changes the role of the teacher from a class dominator to a student learning facilitator.

The flipped classroom learning model is a learning model that combines in-class learning with out-of-class learning with the aim of maximizing learning activities. Learning activities that are usually carried out in class are carried out at home. Conversely, learning activities that are usually carried out at home are carried out in class. Teachers as facilitators package learning materials in digital form in the form of videos for students to study at home so that students are more ready to learn when in class (Karabulut-Ilgu et al., 2018). This Flipped Classroom learning model utilizes learning media that can be accessed online by students who are able to support their learning materials. This model is not just learning using learning videos, but also emphasizes how students use their time in class so that learning is more qualified and can improve students' knowledge and critical thinking skills (Mawaryanto et al., 2024).

Flipped classroom model is in line with Vygotsky's theory, especially in the concept of the Zone of Proximal Development (ZPD), scaffolding, and social interaction. In this model, students study the material independently through videos or readings before class, so that during face-to-face meetings, they can interact, discuss, and solve problems together. The teacher acts as a facilitator who provides scaffolding according to the needs of students, helping them develop from dependence to independent learning (Fitriani et al., 2022). The Flipped Classroom model leverages technology to enhance student learning by providing instructional materials that can be accessed online, such as videos, PowerPoint presentations, or digital learning platforms like Google Classroom, which students are required to study independently before attending class (Salsabila et al., 2024). Students are encouraged to actively engage with the materials at home by taking notes, summarizing key concepts, and identifying areas of difficulty, which enables them to bring questions to class for clarification, thereby promoting deeper understanding (Marpelina et al., 2023).

Classroom sessions focus on collaborative learning, where students interact with peers to share insights, explain concepts, and collectively construct knowledge. Students who grasp the material more quickly can assist those who face challenges, creating a peer-supported learning environment. Group activities also help develop time management and communication skills, while teachers facilitate discussions with minimal intervention, ensuring students take the lead in their learning process (Aeni et al., 2025; Gasparič, 2017). Assessment through final tests or evaluations provides insight into students' mastery of the material, identifies competencies achieved according to the curriculum, and highlights areas requiring further improvement (Asfiati, 2023). Constructive feedback guides students to recognize mistakes, understand strategies for improvement, strengthen learning outcomes, and increase motivation by fostering confidence in their ability to progress (Megavitry et al., 2023).

This Flipped Classroom utilizes technology that supports learning materials for students that can be accessed online. Examples include providing learning videos, Power point or can also be accessed through online learning spaces such as Google Classroom (Rusijono et al., 2023). In

this approach, learning materials must be studied by students at home before learning. Educators in class do not explain the material in detail, but only review the videos that have been given (Budianto et al., 2021). In the Flipped Classroom learning model, the teacher begins by preparing teaching materials that students will study independently at home, considering students' characters, needs, and learning styles to ensure learning objectives are achieved (Maryadi et al., 2023; Tegeh et al., 2022). To accommodate diverse learning preferences, materials are often provided in multiple formats, including digital resources (Aini, 2021). At the start of class, students bring questions or difficulties encountered during their independent study, while the teacher acts primarily as a facilitator (Mujiono, 2021).

Classroom activities then focus on individual and collaborative tasks, where students apply the knowledge gained from pre-class materials under teacher supervision (Amalia, 2023; Mujiono, 2021). This approach shifts the teacher's role from a traditional "sage on the stage" to a guide, promoting active learning (Aini, 2021). One of the educational theories that is the basis for innovative learning is constructivism. According to this theory, knowledge is not something that can be transferred from teachers to students but something that must be built by students themselves through their experiences and interactions with the environment. By positioning students as builders of their own knowledge, constructivism recognizes that learning is an active process that requires active participation and student involvement. This is in accordance with the principles of innovative learning which emphasize the importance of active and participatory learning (Vega et al., 2024).

Lesson plan comes from English consisting of the word lesson which means learning and plan means planning. So lesson plan is a learning plan. In the world of education, planning is a basic thing that must be possessed by an educator, namely teachers and lecturers. Lesson plan is a form of administration of learning activities (RPP) which only applies to one meeting or several meetings (Zahra et al., 2022). Learning planning is prepared for the needs of teachers in carrying out their teaching duties. Thus, planning is an activity of translating the school curriculum into learning activities in the classroom (Setiawati et al., 2023). With the results of this study, it is expected that a more effective education policy strategy can be formulated, including in the development of training for teachers so that they can implement flipped classrooms optimally. In addition, this study can also provide recommendations for schools in developing technology-based learning methods that are more appropriate to the needs of students in the digital era. Thus, this study has a significant contribution in improving the quality of learning in Makassar City, as well as encouraging innovation in the world of education that is more interactive, applicable, and technology-based.

Method

This study uses a quantitative descriptive design with a survey approach. The purpose of this study is to obtain a clear picture of the extent of teachers' understanding and the obstacles they face in implementing the Flipped Classroom learning model. By using a survey approach, data was collected by filling out a series of questions directly from respondents as explained by (Wajdi, 2024), who have experience in using this model, so that the information obtained is expected to provide a deep and relevant understanding of the phenomenon being studied. The population in this study includes all teachers who have implemented the Flipped Classroom learning model in teaching activities, both from various levels of education and different subjects. From this population, a sample of a maximum of 10 teachers was selected using a random sampling technique. This technique is used so that each teacher has an equal

opportunity to be selected as a respondent, as well as to maintain the representation of various backgrounds in the application of the learning model.

In the data collection process, the researcher used the main technique, namely a questionnaire. The questionnaire was designed to explore information about the level of teacher understanding of the concept, implementation strategies, and benefits of the Flipped Classroom model. This questionnaire was compiled in the form of a four-level Likert scale, ranging from strongly disagree to strongly agree, to measure teacher perceptions and attitudes quantitatively. The instrument in this study consisted of 21 statement items designed to measure the level of teacher understanding and the obstacles they face in implementing the Flipped Classroom learning model. These items are grouped into seven main factors that reflect important aspects of the learning model. Each item is assessed using a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree).

The uniformity in these demographic characteristics suggests that the sample group consisted of individuals who had met the minimum formal educational requirements for teaching at the school level, and could be assumed to have experience and professional responsibility in a teaching context. This demographic information is relevant in examining the variation in the level of understanding and perception of teachers towards the Flipped Classroom model , as well as the obstacles to its implementation, because background factors such as age, gender, and education level can influence how teachers adopt and adapt to learning innovations.

The data obtained from the questionnaire were analyzed using the Rasch analysis approach with the help of Ministep software. According to (Muntazhimah, 2023), the Rasch Model was chosen because it is able to convert ordinal data from questionnaire results into interval scale data, which allows data interpretation to be carried out more accurately and meaningfully. In this modeling, response data from each individual (person) and each statement item are analyzed simultaneously to produce a pure score estimate (true score). This score reflects the level of individual understanding of the learning model studied and the level of difficulty of each item in the instrument. This approach not only increases the reliability of the measurement results but also provides an objective picture of teachers' perceptions and understanding of the Flipped Classroom model.

Result

Instrument Validity

The validation process of the Flipped Classroom instrument was carried out using Rasch analysis with the Joint Maximum Likelihood Estimation (JMLE) method to evaluate the psychometric robustness of the scale. The assessment of the fit between person and item was carried out by referring to the infit and outfit mean square (MNSQ) values, where the ideal range is between 0.5 and 1.5, but in studies with small sample sizes, tolerance can be expanded due to higher statistical variability (Mellyzar et al., 2024). In this study, the infit and outfit MNSQ item and person values for all subscales were within the acceptable range, indicating that the participants' responses were quite in accordance with the Rasch model even though the number of respondents was limited.

Table 1. *Rasch parameters for each instrument indicator*

Psychometric attributes	A	B	C	D	E	F	G	Average
Number of items	3	3	3	3	3	3	3	
Mean								
MNSQ outfit items	0.33	0.26	1.21	0.02	0.45	0.07	0.89	0.33

Psychometric attributes	A	B	C	D	E	F	G	Average
MNSQ infit items	0.68	0.63	0.88	0.03	0.42	0.16	0.76	0.51
MNSQ Person Outfit	0.33	0.26	1.21	0.02	0.45	0.07	0.89	0.46
Person infit MNSQ	0.32	0.23	0.30	0.01	0.28	0.07	0.57	0.25
Item separation	5.61	4.69	4.78	3.57	8.09	8.56	5.73	5.86
Person separation	3.08	2.97	3.71	2.44	3.54	3.32	2.16	3.03
Item Reliability	0.97	0.96	0.96	0.93	0.98	0.99	0.97	0.96
Cronbach's Alpha	0.82	0.84	0.23	0.88	0.84	0.88	0.36	0.69
Unidimensionality								
Raw variance explained by measure (%)	99.3%	99.5%	99.6&	100%	99.3&	99.9%	99.1%	
Unexplained variance 1st contrast	0.4%	0.7%	0.4%	0%	0.5%	0.1%	0.9%	

Table 1 presents a summary of the Rasch parameters for the Flipped Classroom Questionnaire, indicating adequate validity and reliability of the instrument across most subscales. The high item separation values across factors (ranging from 3.57 to 8.56) and the full scale (5.86) indicate a fairly good discriminatory capacity of the instrument, even in the context of a small sample size. This indicates that the instrument is able to differentiate respondents based on their level of understanding of the Flipped Classroom principles .Overall, these results indicate that the Flipped Classroom Questionnaire has adequate construct validity, good statistical fit to the Rasch model, very strong item reliability, and support for unidimensionality and local independence. Although there are some weaknesses in internal reliability on some factors, this instrument still provides a strong foundation for use in evaluating teacher perceptions or readiness for Flipped Classroom- based learning .The interaction between the items and respondents' abilities is depicted in the Wright Map (Figure 1)

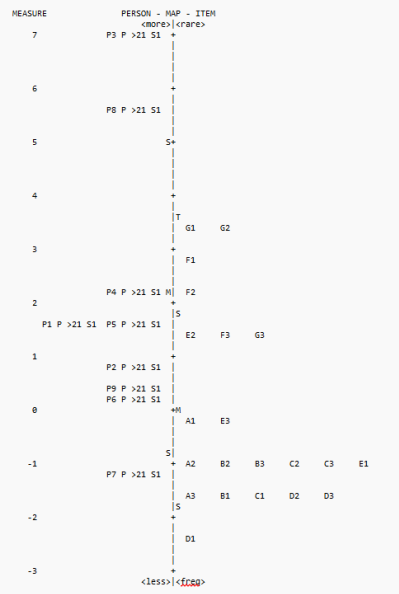

Figure 1. *Wright Map*

where respondents' abilities are shown on the left side and the difficulty of the items on the right side along a common logit scale. The map shows that the distribution of the items is relatively consistent with the distribution of respondents' abilities, although the small number of respondents makes the distribution of abilities appear less even. However, the relative fit between the difficulty of the items and respondents' abilities indicates that the Flipped Classroom instrument is able to measure respondents' perceptions and understanding effectively at various levels. This indicates that the instrument has a fairly representative coverage of the variation in abilities in the sample, and is suitable for use in exploratory contexts and further instrument development.

Wright's map (Figure 1) provides an in-depth visualization of the interaction between respondent ability and item difficulty in the Flipped Classroom Perceptions instrument. On the left side of the map, the abilities of nine respondents are plotted vertically, with respondents with higher abilities (such as P3 and P8) at the top, and those with lower abilities (such as P7) at the bottom. On the right side, the item distribution is arranged by difficulty, from the most difficult at the top (G1, G2) to the easiest at the bottom (D1, D2, D3). The distribution pattern shown shows that most of the items are fairly well distributed along the logit scale, although there is still a slight imbalance at the lower end (more easy items than difficult ones). This is likely due to the small sample size, so that the respondents' ability range is not evenly distributed. However, there is an indication that most of the items fall within the respondents' ability range, indicating that the item targeting is fairly accurate overall.

The distribution of questions and respondents around the middle logit value approaching 0.00 indicates that there is no dominance of ceiling or floor effects. This indicates that the test is neither too difficult nor too easy for this group of respondents. Several questions such as G1, G2, and F1 occupy high logit positions, reflecting a higher level of difficulty, while items such as D1, D2, and D3 occupy lower positions, indicating easier items. Overall, the Wright Map serves as a diagnostic tool that illustrates the alignment between the level of item difficulty and the range of respondent abilities, and indicates that the instrument has good potential for use in similar contexts. With a relatively balanced item distribution and fit with respondent abilities, the instrument demonstrates decent psychometric characteristics and adequate initial validity, especially in the exploratory context and development of the Flipped Classroom literacy instrument.

Instrument Reliability

Reliability evaluation is carried out based on three main parameters, namely item reliability, person reliability, and Cronbach's alpha (α) All three were estimated using WINSTEPS software according to the Rasch approach (Muntazhimah, 2023), as well as classical psychometric reliability standards (Taber, 2018). The results of the analysis show that Item Reliability for all factors is in the range of 0.93 to 0.99, with the highest value in factor F (0.99) and the lowest in factor D (0.93). This value indicates that the level of inter-item consistency is very high, which means that each factor has a consistent level of item difficulty and can be relied on to measure the intended construct. Person Reliability also showed good results, with values ranging from 0.82 to 0.93, reflecting the stability of participants' ability to respond to items on each factor. The highest values were seen in factors C and E (0.93), while the lowest value was in factor G (0.82). This indicates that most respondents have a stable response rate, although there is a little irregularity in factor G.

The Cronbach's alpha (α) value shows that internal consistency varies between factors. Factors D, E, and F have high α values (≥ 0.84), indicating very good internal consistency. However, there are two factors with low α values, namely factors C (0.23) and G (0.36), which indicate potential problems in the homogeneity of items on the subscale. This could be due to the limited number of items, lack of construct coherence, or differences in respondents' interpretation of the contents of the items.

In general, the reliability values of the items and individuals meet the Rasch standard (>0.67), so the instrument is considered reliable according to the modern measurement model. However, variations in Cronbach's alpha indicate the need for refinement or revalidation of certain factors, especially C and G. Nevertheless, the majority of factors show strong reliability,

supporting the use of this instrument to assess participants' perceptions of the Flipped Classroom learning model. For more details, see the table below:

Table 2. *Instrument Reliability*

Reliability	Instrument						
	A	B	C	D	E	F	G
Item reliability	0.97	0.96	0.96	0.93	0.98	0.99	0.97
Person reliability	0.90	0.90	0.93	0.86	0.93	0.92	0.82
Cronbach's alpha (α)	0.82	0.84	0.23	0.88	0.84	0.88	0.36

Table 2 presents the reliability indices for the seven instruments (A–G) used in this study. Item reliability values ranged from 0.93 to 0.99, indicating that the items consistently measure the intended construct across respondents. Person reliability ranged from 0.82 to 0.93, demonstrating acceptable consistency in respondents' performance. Cronbach's alpha values varied between 0.23 and 0.88, with most instruments exceeding the commonly accepted threshold of 0.70, suggesting satisfactory internal consistency. Instrument G showed a relatively low Cronbach's alpha (0.36), indicating potential issues with internal consistency that may require further review or refinement. Overall, these results support the adequacy of the instruments for assessing the targeted constructs, with strong item reliability and generally acceptable person reliability.

Teacher Evaluation of the Flipped Classroom Learning Model

Table 3. *Based on Gender, Age and Last Education*

Demographic Group	N	M (score)	M (logit)	SD	Person reliability
Gender					
Woman	9	67.8	1.37	1.89	0.90
Age					
>21	9	67.8	1.37	1.89	0.90
last education					
College	9	67.8	1.37	1.89	0.90

In Table 3. The results of the analysis of understanding scores for the flipped classroom learning model based on gender, age, and last level of education show certain demographic patterns in teacher readiness to implement this learning approach (Table 4). Female teachers obtained an average logit score of 1.37 (SD = 1.89), with a person reliability value of 0.90. Although comparative data with male teachers are not available, the high reliability value indicates that this instrument is able to measure teacher abilities consistently and reliably.

In terms of age, teachers over 21 years old showed the same logit score, which was 1.37 (SD = 1.89), and person reliability of 0.90. These results indicate that more mature teachers tend to have a better understanding and readiness in implementing the flipped classroom model, in line with the assumption that professional experience and maturity in teaching practice contribute to the acceptance and adaptation of learning innovations. In terms of the last educational background, teachers who are college graduates also recorded an average logit score of 1.37 (SD = 1.89) with the same person's reliability of 0.90. This shows that academic background plays a role in shaping teacher readiness for pedagogical innovation, including flipped learning. Overall, the high and consistent person reliability scores (0.90) across demographic groups confirm that the instrument used to measure teacher understanding and readiness for flipped classrooms has strong reliability. These results support the importance of training that considers demographic factors in efforts to strengthen the effective implementation of flipped classrooms at various levels of education.

Table 4. *Categorization of the difficulty level of flipped classroom instruments*

Indicator	Difficulty Level			
	Level 1	Level 2	Level 3	Level 4
A	A2, A3	A1	-	-
B	B1, B2, B3	-	-	-
C	C1, C2, C3	-	-	-
D	D1, D2, D3	-	-	-
E	E1	E2, E3	-	-
F	-	FE	F2, F3	-
G	-	G3	G1, G2,	-

Item Difficulty Level (LVI) analysis was used to assess the difficulty level of items based on the mean logit (0.00) and one standard deviation (SD = 1.69), with a threshold set at ±2SD (±3.38 logit). This approach allows the classification of items into four different categories: Level 1 (LVI ≥ mean logit + 1SD, very difficult), Level 2 (1SD > LVI ≥ mean logit, difficult), Level 3 (mean logit > LVI ≥ −1SD, moderate), and Level 4 (LVI < −1SD, very easy), as shown in Table 6. Based on the analysis results, indicator A shows two items (A2 and A3) are in the very difficult category (Level 1), one item (A1) is categorized as difficult (Level 2), and there are no items in the medium or very easy categories. Indicator B shows all of its items (B1, B2, and B3) are in the very difficult category (Level 1). Likewise, indicator C (C1, C2, and C3) and indicator D (D1, D2, and D3) are all included in the very difficult category (Level 1). For indicator E, one item (E1) is classified as very difficult (Level 1), while the other two items (E2 and E3) are in the difficult category (Level 2). In indicator F, there are no items in the very difficult or difficult category, but two items (F2 and F3) are in the moderate category (Level 3). Meanwhile, indicator G shows one item (G3) as difficult (Level 2), and two items (G1 and G2) as moderate (Level 3).

These findings show a varying distribution of difficulty levels among indicators, reflecting a wide range of cognitive complexity. This provides an important basis for the development of more adaptive and differentiated learning strategies, in order to meet the learning needs of students more effectively. This classification also helps in designing questions that are balanced in terms of difficulty, thereby increasing the validity of the assessment and encouraging the achievement of optimal learning outcomes.

Discussion

The findings of this study indicate that the Flipped Classroom Questionnaire demonstrates adequate construct validity, strong statistical fit to the Rasch model, high item reliability, and supports unidimensionality and local independence (Chou, 2020). Factors such as D (Characteristics) and F (Implementation) showed high reliability with Cronbach's Alpha values of 0.88, while subscales C (Stages) and G (Constraints & Solutions) showed low reliability (0.23 and 0.36, respectively). This indicates the need for re-examination or revision of the items in these factors to improve internal consistency, especially considering the sensitivity of reliability to small sample sizes. these results indicate that the Flipped Classroom Questionnaire has adequate construct validity, good statistical fit to the Rasch model, very strong item reliability, and support for unidimensionality and local independence.

Although there are some weaknesses in internal reliability on some factors, this instrument still provides a strong foundation for use in evaluating teacher perceptions or readiness for Flipped Classroom- based learning. These results align with previous research emphasizing the importance of valid and reliable instruments in assessing teacher readiness for innovative pedagogical models (Luo, 2022). The study by researcher also confirmed the efficacy of using

Rasch model analysis to validate instruments in the context of flipped classroom implementation, reinforcing the significance of robust statistical modeling in educational research (Yang, 2022). The Flipped Classroom Questionnaire, with its demonstrated psychometric strengths, serves as a valuable tool for assessing teacher readiness and perceptions, facilitating informed decisions in the implementation of flipped classroom strategies (Abdurrahman, 2018).

Reliability is a fundamental aspect of assessment instruments, encompassing the consistency of measurements across various dimensions (Price et al., 2015). Reliability refers to the consistency of a measure, highlighting its importance in ensuring that instruments yield stable results over time, across items, and among different raters (Sullivan, 2011). Person reliability indices are significant in evaluating the validity of a test or survey instrument, as they help assess the consistency of individual responses (Zou, 2023). The assessment of item and person reliability is crucial for determining the quality and usefulness of a test. High reliability ensures that the measurement system produces similar results under the same conditions, which is vital for drawing meaningful conclusions from research studies (Frost, 2021).

The reliability of instruments assessing teacher readiness for flipped classrooms is paramount, recent studies have demonstrated that such instruments exhibit high internal consistency, with Cronbach's alpha coefficients ranging from 0.852 to 0.898, indicating strong reliability (Samaila et al., 2021). the consistency of these instruments across various demographic groups supports the notion that teacher readiness is a robust construct, not significantly influenced by factors such as gender, age, or years of teaching experience. These findings underscore the importance of utilizing reliable instruments to accurately gauge teacher preparedness for flipped classroom implementation. By acknowledging and addressing the unique needs of different teacher groups, such training programs can foster a more inclusive and effective adoption of flipped classroom methodologies.

The analysis of our study revealed a varying distribution of difficulty levels across the assessed indicators, indicating a broad spectrum of cognitive complexity among students. This diversity highlights the necessity of developing adaptive and differentiated learning strategies that can better address the individual needs of learners (Ravand et al., 2025). Our findings also show that by classifying questions according to their difficulty levels, educators can design assessments that are more balanced, which not only enhances the validity of the evaluation but also supports students in achieving optimal learning outcomes (Rincon et al., 2024).

Conclusion

This study concluded that teachers in Makassar City have a fairly good understanding of the concept of the Flipped Classroom learning model, especially in terms of its objectives, benefits, and implementation. Rasch analysis showed that the instrument used had adequate validity and reliability, although there were weaknesses in several specific subscales. Most of the instrument items were classified as difficult, indicating high cognitive demands on teachers' understanding of this model. In addition, the most common obstacles faced by teachers include limitations in infrastructure, technology adaptation, and time readiness to prepare learning materials.

This study emphasizes the importance of more intensive and sustainable training for teachers, as well as the need for support from schools and the government in providing digital-based learning facilities. The Flipped Classroom model has great potential in improving the quality of student-centered learning, but its implementation must be adjusted to the context and

overall teacher readinessIn suggestion, please describe your recommendation for further studies regarding your research implication.

Acknowledgment

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Reference

Abdurrahman, M. (2018). Learning Strategy Oriented to Educational Process Standards. Jakarta: Rajawali Pers.

Aeni, N., & Fatkhiyani, K. (2025). Implementasi Model Missouri Mathematics Project (MMP) Berbantuan Media Untuk Meningkatkan Kemampuan Berpikir Kritis Dan Kolaborasi Siswa. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 10*(03), 344-357. https://doi.org/10.23969/jp.v10i03.30267

Aini, K. (2021). Kemandirian Belajar Mahasiswa Melalui Blended Learning Tipe Flipped Classroom pada Masa Pandemi Covid-19. *Jurnal Literasi Digital, 1*(1), 42–49. https://doi.org/10.54065/jld.1.1.2021.7

Asfiati, A. (2023). Merdeka Curriculum: Encouraging Creativity and Innovation of Islamic Religious Education Teachers in Madrasah. Al-Hayat: Journal of Islamic Education, 7(2), 681-698. https://doi.org/10.35723/ajie.v7i2.525

Budianto, Y., Syakur, A., & Yunus, N. M. (2021). Pengembangan Bahan Ajar Biologi Materi Ruang Lingkup Biologi Dengan Model Pembelajaran Flipped Classroom Pada Kelas X SMAN 5 Palopo. *Jurnal Pelita: Jurnal Pembelajaran IPA Terpadu, 1*(2), 66–73. https://doi.org/10.54065/pelita.1.2.2021.90

Chou, C. L. (2020). Developing and validating a scale for measuring teachers' readiness for implementing a flipped classroom approach. British Journal of Educational Technology, 51(4), 1420–1435. https://doi.org/10.1111/bjet.12895

Fitriani, II, Napitupulu, CA, Balimulia, SO, Telaumbua, EF, & Saraswatie, I. (2022). Implementation of the flipped classroom model in early childhood science learning. *Journal of Education and Psychology: Pintar Harati, 18*(2), 93–107. https://doi.org/10.36873/jph.v18i2.8142

Gasparič, R. P. (2017). Jonathan Bergmann and Aaron Sams, Flipped Learning: Gateway to Student Engagement, International Society for Technology in Education: Eugene, Oregon and Washington, DC, 2014; 169 pp.: ISBN 978-1-56484-344-9. *Center for educational policy studies journal, 7*(3), 173-176. https://doi.org/10.26529/cepsj.293

Karabulut-Ilgu, A., Jaramillo Cherrez, N., & Jahren, C.T. (2018). A systematic review of research on the flipped learning method in engineering education. *British Journal of Educational Technology, 49* (3), 398–411. https://doi.org/10.1111/bjet.12548

Luo, S. (2022). Validation of a measure of flipped English learning readiness: A Rasch model analysis. *Frontiers in Psychology, 13*, 846781. https://doi.org/10.3389/fpsyg.2022.846781

Maolidah, IS (2017). Effectiveness of Implementing the Flipped Classroom Learning Model in Improving Critical Thinking Skills. *Edutcehnologia, 3* (2), 160–170.

Marpelina, L., Sariyatun, S., & Andayani, A. (2023). Shifting paradigms: Innovations in teaching history in the Fourth Industrial Revolution. *Path of Science, 9*(12), 3011-3018. https://doi.org/10.22178/pos.99-5

Maryadi, M., Ni'am, AU, & Pravitasari, D. (2023). Classroom teacher strategies in dealing with students' learning styles in elementary schools. *FingeR: Journal of Elementary School, 2*(1), 1–10. https://doi.org/10.30599/finger.v2i1.437

Mawaryanto, E., Novitasari, A. T., & Faisal, B. I. (2024). The Effectiveness of the Flipped Classroom Learning Model on Students' Critical Thinking Skills in Civics Subjects. *Jurnal Amal Pendidikan, 5*(1), 15-23. https://doi.org/10.36709/japend.v5i1.99

Megavitry, R., Salfin, S., Akbar, K. F., & Taryana, T. (2023). Analysis of Learning Material Quality and Teacher-Student Interaction on Learning Achievement and Student Satisfaction Level in Distance Education in Indonesia. *The Eastasouth Journal of Learning and Educations, 1*(03), 147-160. https://doi.org/10.58812/esle.v1i03.160

Mellyzar, M., Andriani, R., Lukman, I. R., Muttakin, M., Wati, E., Pasaribu, A. I., & Fadli, M. R. (2024). Digital Assessment Tools: As a Media for Assesing High School Science Learning. Jurnal Penelitian Pendidikan IPA, 10(3), 1362-1374. https://doi.org/10.29303/jppipa.v10i3.6416

Ministry of Education and Culture. (2020). Learning Strategies during the COVID-19 Pandemic. Jakarta: Ministry of Education and Culture of the Republic of Indonesia.

Mujiono, N. (2021). Flipped Classroom: School Without Homework. *Jurnal Teknodik, 25* (1), 67. https://doi.org/10.32550/teknodik.v25i1.457

Price, P. C., Jhangiani, R., & Chiang, I. C. A. (2015). *Research methods in psychology*. BCCampus.

Ravand, H., Shahi, R., & Effatpanah, F. (2025). Investigating Levels of Bloom's Taxonomy in a University Entrance Examination Using Cognitive Diagnostic Modeling. In *Frontiers in Education* (Vol. 10, p. 1644811). Frontiers. https://doi.org/10.3389/feduc.2025.1644811

Rincon-Flores, E. G., Castano, L., Guerrero Solis, S. L., Olmos Lopez, O., Rodríguez Hernández, C. F., Castillo Lara, L. A., & Aldape Valdés, L. P. (2024). Improving the learning-teaching process through adaptive learning strategy. *Smart Learning Environments, 11*(1), 27. https://doi.org/10.1186/s40561-024-00314-9

Rusijono, R., & Khotimah, K. (2023). Training and Mentoring in the Development of Test Instruments for Measuring Learning Outcomes of Muhammadiyah School. *International Journal of Community Service Learning, 7*(3), 272-281.

Salsabila, Y. R., & Muqowim, M. (2024). Korelasi antara teori belajar konstruktivisme lev vygotsky dengan model pembelajaran problem based learning (pbl). *Learning: Jurnal Inovasi Penelitian Pendidikan Dan Pembelajaran, 4*(3), 813-827. https://doi.org/10.51878/learning.v4i3.3185

Samaila, K., & Samaila, K. (2021). Using Flipped Classroom Model: Factors Influencing Students' Satisfaction. *European Journal of Interactive Multimedia and Education, 2*(2), e02112. https://doi.org/10.30935/ejimed/11260

Setiawati, M., Arifin, Z., & Defirono, I. (2023). The leadership of the school principal in realizing independent learning. Jurnal Ilmu Pendidikan Dan Sains Islam Interdisipliner, 203-216. https://doi.org/10.59944/jipsi.v2i4.223

Tegeh, I. M., Santyasa, I. W., Agustini, K., Santyadiputra, G. S., & Juniantari, M. (2022). Group investigation flipped learning in achieving of students' critical and creative thinking viewed from their cognitive engagement in learning physics. *Journal of Education Technology, 6*(2), 350-362. https://doi.org/10.23887/jet.v6i2.44417

Yang, Y. (2022). Essays in Spatial Econometrics. Ohio State University Graduate Theses and Dissertations.

Zahra, FF, & Prastowo, A. (2022). Fun, Effective and Islamic Learning Design (Analysis of Integrated Thematic Lesson Plan Study). *JIIP - Scientific Journal of Educational Sciences , 5* (11), 4622–4626. https://doi.org/10.54371/jiip.v5i11.1052

Zou, T. (2023). Person misfit and person reliability indices in item response theory. *Measurement: Interdisciplinary Research and Perspectives, 21*(1), 1–15. https://doi.org/10.1080/15366367.2022.2114243