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Development of academic supervision instruments based on differentiated instruction in merdeka curriculum

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Abstract

Academic supervision plays an important role in improving school learning quality. However, its implementation remains suboptimal, particularly regarding the instruments used and their alignment with differentiated instruction in the Merdeka Curriculum. This study aims to develop academic supervision instruments based on differentiated instruction, based on the Merdeka Curriculum. The products include a teaching module review instrument, a classroom observation tool, and a simple digital tool to support their use. The research employed a research and development (R&D) approach with the Borg and Gall model, covering six stages: problem identification, data collection, product design, design validation, design revision, and product testing. The subjects were 10 principals and three expert validators in Dabin II, Subah in Batang Regency. Data were collected using validation questionnaires and user response surveys. Validation results showed all items were rated Good to Excellent with an average score of 0.90, while principal responses indicated very high practicality with an average score of 94.05%. These findings confirm that the developed instruments are valid, practical, and effective in supporting the implementation of differentiated instruction within the Merdeka Curriculum.

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1. Introduction

Academic supervision plays a strategic role in improving the quality of education. It functions as a control mechanism designed to guide, monitor, and manage the implementation of instructional practices, thereby supporting teachers in successfully carrying out their instructional duties. The quality of academic supervision greatly influences the effectiveness of the teaching and learning process (Herawati, 2021). In this regard, school principals are responsible for effectively implementing academic supervision, as mandated by the Regulation

of the Minister of Education, Culture, Research, and Technology Number 40 of 2021 concerning the Assignment of Teachers as School Principals. This regulation emphasises that school principals are responsible for managerial duties, entrepreneurial development, and the supervision of teachers and education staff. Thus, instructional success is largely determined by principals' instructional leadership, with supervision as their primary instrument (Purbasari, 2015).

Furthermore, the process of academic supervision generally consists of three main stages: planning, implementation, and follow-up (Regulation of the Minister of National Education No. 13 of 2007). The planning stage requires a systematic design to ensure that supervision runs effectively. In the implementation stage, valid and practical supervision instruments are essential. Valid instruments guarantee the accuracy of the collected data, while practical instruments make it easier for principals to apply them. The follow-up stage aims to help teachers reflect on their teaching practices and improve less effective areas (Hanief, 2016). In the implementation stage within the context of the Merdeka Curriculum, the availability of instruments that can specifically measure the application of differentiated instruction becomes crucial.

Moreover, in implementing the Merdeka Curriculum, differentiated instruction is a key strategy to accommodate the diverse characteristics of students, including readiness, interests, and learning profiles (Fadilla et al., 2021). Therefore, academic supervision should ensure general instructional quality and provide instruments to capture how teachers apply differentiated instruction. In line with this, previous studies have shown that systematically developed supervision instruments can improve principals' competencies while strengthening the effectiveness of supervision (Hariyati, 2020; Masliah, 2019; Sriyanto et al., 2022). Hence, developing academic supervision instruments based on differentiated instruction is urgently needed to enhance supervision effectiveness and support the successful implementation of the Merdeka Curriculum in schools.

2. Literature Review (if applicable)

2.1 Academic Supervision

Academic supervision is a systematic effort conducted by school principals or supervisors to assist teachers in improving instructional quality. Sudjana (2011) states that supervision fosters teacher professionalism through guidance and monitoring learning practices. Aqib (2013) defines supervision as a planned program to enhance teaching quality by improving teaching tools and processes. Similarly, Kompri (2015) views supervision as part of educational management to ensure the achievement of instructional objectives. Research shows that effective academic supervision significantly improves teacher performance and student learning outcomes (Herawati et al., 2021; Purbasari, 2015).

2.2 Academic Supervision Instruments

The effectiveness of supervision depends on the instruments used. Valid and practical supervision instruments ensure principals collect accurate data while making the process efficient (Sugiharni & Setiasih, 2018). These instruments generally include teaching module review forms, lesson planning checklists, classroom observation guides, and post-observation interview sheets (Kemdikbudristek, 2019). Previous studies highlight that well-developed supervision instruments enhance the reliability of supervisory practices and lead to more constructive teacher feedback (Hariyati et al., 2022; Sriyanto, 2022; Mujab, 2018).

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2.3 Differentiated Instruction

Differentiated instruction is a pedagogical approach that adjusts learning content, process, and products according to students' readiness, interests, and learning profiles (Fadilla et al., 2021). Tomlinson's framework underlines that differentiation promotes inclusive learning by recognising students' diverse characteristics. Maryam (2021) emphasises that understanding learners' uniqueness allows teachers to design meaningful learning experiences. Several studies have found that differentiated instruction significantly improves student engagement and achievement (Ilham Farid et al., 2022; Swandewi, 2021).

2.4 The Merdeka Curriculum

The Merdeka Curriculum represents Indonesia's educational reform, emphasising flexibility, contextualisation, and student-centred learning. It encourages schools to adapt learning according to local needs and to promote the Profil Pelajar Pancasila (Kemendikbudristek, 2022). Merdeka Belajar (Independent Learning) allows teachers more autonomy in instructional design (Koesoema, 2020). Literature shows that project-based learning and differentiated instruction are central strategies in realising the goals of the Merdeka Curriculum (Sherly et al., 2020).

2.5 Integration of Academic Supervision with Differentiated Instruction

Effective supervision within the Merdeka Curriculum must integrate differentiated instruction principles. Supervision instruments may fail to capture teachers' competencies in implementing curriculum mandates without such alignment. Hanief (2016) argues that supervision should serve as a reflective tool for teachers, helping them identify strengths and weaknesses in teaching practices. Studies by Hariyati et al. (2022) and Nisa et al. (2023) confirm that developing supervision instruments aligned with contemporary pedagogical strategies, such as differentiation and digital integration, enhances both validity and practicality of supervision.

The principles of differentiated instruction, as outlined by Tomlinson, emphasise differentiation of content, process, and product as strategies to address diverse student learning needs. Content differentiation involves adapting learning materials to students' readiness, interests, and learning profiles; process differentiation relates to varying learning activities and how students engage with information; while product differentiation highlights variation in learning outcomes expected from students (Fadilla et al., 2021; Ilham Farid et al., 2022). These three aspects are fundamental to instructional practice and should also be reflected in school principals' academic supervision instruments.

In this study, the principles of differentiation directly influence the composition of components and descriptors in the developed instruments. The teaching module review instrument uses indicators to assess how teachers plan objectives, activities, and assessments aligned with students' diverse needs. Meanwhile, in the classroom observation instrument, descriptors are focused on capturing the implementation of differentiation strategies during instruction, such as using varied learning media, managing student interactions, and providing feedback tailored to different learning profiles. Therefore, integrating differentiation principles into the instruments strengthens their content validity and ensures their relevance to the Merdeka Curriculum, emphasising inclusive and student-centred learning.

3. Method

This study employed a research and development (R&D) approach using the Borg and Gall model. The research stages included (1) identification of potentials and problems, (2) data collection, (3) product design, (4) design validation, (5) design revision, and (6) product testing.

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The study was conducted in ten elementary schools in Subah District, Batang Regency, namely SDN Subah 01, SDN Adinuso 01, SDN Adinuso 02, SDN Sengon 01, SDN Sengon 02, SDN Durenombo 02, SDN Clapar, SDN Tenggulangharjo, SDN Menjangan, and SDN Kalimanggis. The research activities took place from July to December 2023.

The research subjects consisted of ten school principals as instrument users and three expert validators. The validators were school supervisors in Batang, namely: (1) Siswadi, S.Pd., M.Pd., (2) Juremi, S.Pd., M.Si., and (3) Waryono, S.Pd., M.Si. Their qualifications as experienced school supervisors contributed significantly to ensuring the content validity of the developed instruments.

The instruments developed included (1) a lesson module review instrument, (2) a learning observation instrument, and (3) a digital worksheet based on Microsoft Excel. The digital worksheet was designed to facilitate the supervision process. Scores could be selected with a single click, results were automatically calculated, and assessment categories were generated without manual calculation. This improved the practicality and efficiency for both principals and supervisors.

Data Collection Techniques are (1) Preliminary Study: data were collected through needs assessment questionnaire administered to school principals and a literature review on academic supervision based on differentiated instruction, (2) Development Stage: validation data of the instruments were obtained from questionnaires completed by the validators. The validity was tested using Aiken's V formula, and (3) Evaluation Stage: Practicality data were obtained from school principals' responses after using the instruments during the field trial.

Data Analysis Techniques were applied in the preliminary study stage to analyse principals' needs. Quantitative analysis was applied to examine the validation results (using Aiken's V) and principals' responses (using practicality percentages based on Riduwan, 2009).

4. Results

4.1 Preliminary Study Stage

The research potential and problems were identified by analysing a needs assessment questionnaire completed by school principals. The questionnaire was administered to ten principals in Dabin II, Subah District. The results of the needs analysis are presented in the table below.

Table 1. Needs questionnaire analysis results

No	Questions	Responses
1.	Has your school implemented the Merdeka Curriculum in all classes?	All schools (100%) implement the Merdeka Curriculum in all classes.
2.	In your opinion, how important is academic supervision?	All principals (100%) consider academic supervision to be important.
3.	When do you conduct academic supervision?	All principals (100%) conduct academic supervision every semester.
4.	What supervision instruments do you use during supervision activities?	All principals (100%) use teaching module review and classroom observation instruments.
5.	Do the academic supervision instruments you use align with the Merdeka Curriculum?	Nine principals (90%) report that the instruments used are not aligned with the Merdeka Curriculum.

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No	Questions	Responses
6.	Do the academic supervision instruments you use accommodate differentiated instruction?	Nine principals (90%) indicate that the instruments do not accommodate differentiated instruction.

The results indicate that all schools have implemented the Merdeka Curriculum in every class, and all principals recognise the importance of academic supervision, which is routinely conducted twice a year. In practice, principals rely on two main instruments: the teaching module review instrument and the classroom observation instrument.

4.2 Design Validation

The following table presents the validation results for the teaching module review and classroom observation instruments.

Table 2. Validation results of the teaching module review instrument

No.	Components	Validators			V	Categories
		I	II	III		
1.	Coverage of student learning needs analysis	4	4	4	1.00	Very Good
2.	Relevance of the Pancasila Student Profile to learning and assessment activities	4	3	3	0.78	Good
3.	Use of varied learning media	3	4	4	0.89	Very Good
4.	Accuracy in selecting learning media	3	4	4	0.89	Very Good
5.	Learning objectives reflect both process and outcomes	4	4	4	1.00	Very Good
6.	Appropriateness of learning objectives formulation	4	4	4	1.00	Very Good
7.	Learning activities aligned with objectives and Pancasila Student Profile, differentiated, student-centred, and integrating 21st-century skills and literacy	3	4	4	0.89	Very Good
8.	Learning activities are enjoyable, inspiring, interactive, challenging, and motivating	4	3	4	0.89	Very Good
9.	Types of differentiated instruction implemented	3	3	3	0.67	Good
10.	Alignment of instructional strategies with objectives and students' needs	3	3	4	0.78	Good
11.	Alignment of assessment with learning objectives and Pancasila Student Profile	3	4	4	0.89	Very Good
12.	Completeness of assessment	4	4	4	1.00	Very Good
13.	Accuracy of follow-up activities	4	3	4	0.89	Very Good
14.	Accuracy of reflection activities	3	4	4	0.89	Very Good
15.	Completeness of the teaching module attachments	4	4	4	1.00	Very Good
Average					0.90	Very Good

The researcher revises the instrument based on nine suggestions from validators, such as the alignment of media with student interests, inclusion of subject information, improvement of

formatting, item synchronisation, and development of applications and web-based platforms. Table 2 shows that all items fall into the Very Good and Good categories with an average score of 0.90. This result is in line with the statement by Sugiharni and Setiasih (2018), which affirms that scores within these categories indicate instrument validity. Therefore, the differentiated teaching module review instrument is considered valid and appropriate.

Table 3. Validation results of the classroom observation instrument

No.	Components	Validators			V	Categories
		I	II	III		
1.	Conducting introductory activities	4	4	4	1.00	Very Good
2.	Delivering apperception	4	4	4	1.00	Very Good
3.	Presenting learning objectives and materials to be studied	4	4	3	0.89	Very Good
4.	Motivating students in various ways	3	3	4	0.78	Good
5.	Reinforcing character education based on the Pancasila Student Profile and work culture	4	3	4	0.89	Very Good
6.	Conducting learning in a structured and interactive manner	3	3	3	0.67	Good
7.	Relating the subject matter to other relevant knowledge	4	4	4	1.00	Very Good
8.	Facilitating interaction between the teacher and students, and among students	3	4	4	0.89	Very Good
9.	Accommodating the diverse characteristics of students	3	4	4	0.89	Very Good
10.	Implementing varied differentiated instruction	4	4	3	0.89	Very Good
11.	Using instructional time efficiently and effectively	4	3	4	0.89	Very Good
12.	Conducting learning that fosters 21st-century skills and literacy	3	3	4	0.78	Good
13.	Fostering healthy and harmonious interpersonal relationships	4	4	3	0.89	Very Good
14.	Using learning media and resources skilfully with student involvement	3	4	4	0.89	Very Good
15.	Providing appropriate feedback	4	3	4	0.89	Very Good
16.	Using proper, correct, and effective language	4	3	4	0.89	Very Good
17.	Creating summaries and/or conclusions involving students	4	4	4	1.00	Very Good
18.	Conducting reflection activities by the teacher and students	3	4	4	0.89	Very Good
19.	Conducting formative assessment at the end of instruction, followed by remediation/enrichment	4	3	4	0.89	Very Good
20.	Assigning tasks or homework to encourage independent learning	4	4	3	0.89	Very Good
Average					0.89	Very Good

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Table 3 shows that all items fall within the Very Good and Good categories, with an average score of 0.89 categorised as Very Good. According to Sugiharni and Setiasih (2018), items that fall into the Very Good, Good, or Fair categories meet the validity criteria. Therefore, the differentiated classroom observation instrument satisfies the validity test and is appropriate for use.

4.3 Practicality validation stage

Table 4. Principal Response Questionnaire Results

No.	Evaluated Aspects	Practicality Score (%)	Categories
1	Appearance	89.33	Very Practical
2	Language	98.00	Very Practical
3	Attractiveness	94.00	Very Practical
4	Equivalence	90.00	Very Practical
5	Interpretation	96.00	Very Practical
6	Usability	95.00	Very Practical
7	Time	96.00	Very Practical
Average Practicality Score		94.05	Very Practical

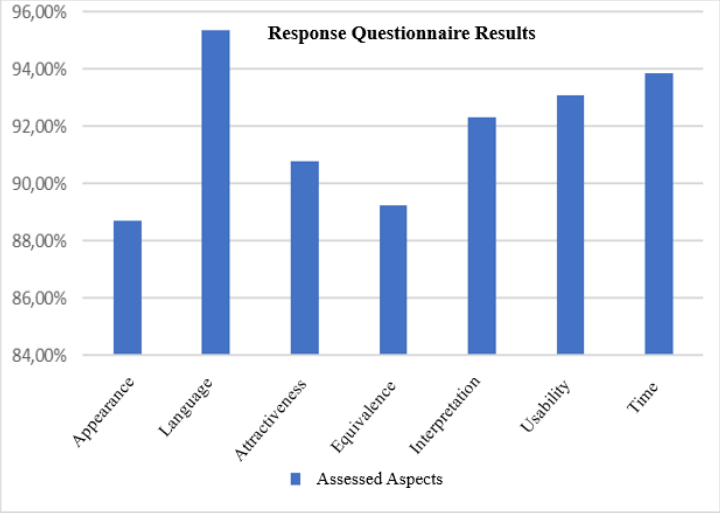

Figure 1. School principals' response questionnaire results

Based on the table and figure above, it can be concluded that all evaluation aspects achieve scores above 80%, with an average practicality score of 94.05%. According to Riduwan (2009), a score range between 80% and 100% falls under the Very Practical category.

Based on this classification, the academic supervision instruments based on differentiated instruction within the implementation of the Merdeka Curriculum meet the Very Practical use criteria.

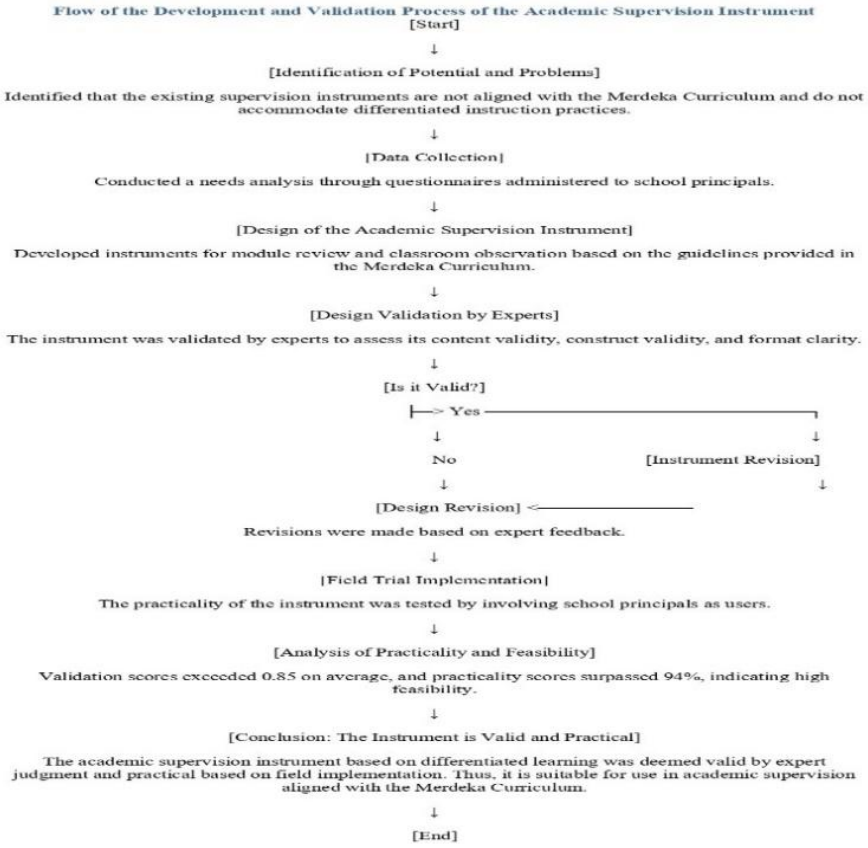

Figure 2. Flow of the development and validation process of the academic supervision instrument

5. Discussion

5.1 Implementation of academic supervision

The analysis of school principals' needs assessment questionnaires regarding the implementation of academic supervision revealed several key findings. First, there was a mismatch in the use of supervision instruments. Principals were still using instruments from the 2013 Curriculum, while teachers had already implemented the Merdeka Curriculum. As a result, the supervision outcomes were invalid and did not accurately reflect teachers' actual competencies.

Second, the instruments did not accommodate differentiated instruction. Consequently, supervision could not effectively assess the implementation of differentiated instruction, despite it being a crucial component of the Merdeka Curriculum. Principals lacked instruments that could support supervision of this instructional approach.

Third, the descriptors within the supervision instruments were not specific. The lack of precision in descriptors made it difficult to assign scores, reduced the validity of supervision results, and made the process less efficient and time-consuming.

5.2 Validity of academic supervision instruments based on differentiated instruction

The academic supervision instruments developed in this study were subjected to content validity testing. The validation results for the teaching module review instrument showed that all items were categorised as Very Good or Good, with an average validity score of 0.90. In contrast,

the classroom observation instrument reached an average of 0.89. These findings indicate that the instruments are highly valid.

These results are consistent with the findings of Hariyati (2020), who also reported high validity coefficients in developing academic supervision instruments. However, the research instruments offer a unique advantage, namely the inclusion of more specific descriptors that directly align with differentiated instruction within the Merdeka Curriculum. This makes the instruments not only valid but also contextually relevant compared to previous instruments that were still oriented toward the 2013 Curriculum.

Furthermore, these results align with Sriyanto et al. (2022), who emphasised that supervision instruments aligned with modern pedagogical approaches—such as STEM or differentiation—achieve better validity and relevance. This study expands those findings by incorporating simple digital features that support practical use in the field.

5.3 Practicality of academic supervision instruments based on differentiated instruction

The practicality test results indicated an average score of 94.05%, categorised as Very Practical. Clear descriptors, an automated scoring system, and time efficiency supported this high practicality. These findings align with Hariyati (2020), who found that clear indicators simplify the assessment process for principals. However, this study goes further by emphasising the contribution of automation, which has not been widely highlighted in previous studies.

This study highlights a different contribution compared to Sriyanto (2022), who developed STEM-based supervision instruments to improve instructional quality. The differentiated-instruction-based instruments developed here are not only practical but also capable of capturing diverse student characteristics in accordance with Merdeka Curriculum principles. Therefore, this research adds value by integrating academic supervision, differentiated learning, and curriculum demands into a coherent system.

5.4 Implications

This study demonstrates that valid and practical supervision instruments can be developed by incorporating specific descriptors, ensuring alignment with current curriculum policies, and embedding features that enhance efficiency, such as automated scoring. By comparing the findings with previous studies, it is evident that this study reinforces existing knowledge and contributes uniquely by producing instruments that are more contextual, efficient, and responsive to supervision needs in implementing the Merdeka Curriculum.

6. Conclusion and Recommendations

6.1 Conclusion

The academic supervision instruments based on differentiated instruction developed in this study have undergone a validation process, resulting in average scores of 0.90 and 0.89 in the Very Good category, indicating that the instruments are feasible for use. In addition, the practicality test yielded an average score of 94.05% in the Very Practical category. This achievement was supported by ease of interpretation, ease of use, and time efficiency. Therefore, the instruments produced can assist school principals in carrying out academic supervision in line with the Merdeka Curriculum requirements and in assessing the implementation of differentiated instruction more accurately.

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6.2 Recommendations

Based on the findings, several recommendations reveal that school principals are encouraged to use the instruments as structured tools to provide more objective and systematic feedback to teachers regarding the implementation of differentiated instruction; educational institutions and authorities should support the dissemination and adaptation of these instruments to a wider range of schools and conduct training programs for principals and supervisors to optimise their use in improving learning quality. Future researchers are advised to test the instruments with larger and more diverse samples while also examining their long-term impact on teachers' competence in applying differentiated instruction and on student learning outcomes.

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