

Design of Curriculum Adaptation Model Based on Decision Support System

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Abstract: Inclusive education aims to provide access and accommodation for students to achieve achievements based on their competence. A curriculum adaptation model has been developed as a guide to fulfill the student learning needs. This model is inefficient because the teacher considers the initial assessment and modifications/adjustments in learning outcomes troublesome. This study explains the development of a more efficient and attractive decision-support technology-based curriculum adaptation model. This technology development results 6-step system development process. The development design is carried out by implementing a decision support system that can reveal the student characteristics. It also can recommend student learning needs and achievement. So, the teachers can use that information to develop learning designs that adjust to students' characteristics. The analysis outline consists of procedures, component design models, realization, and implementation involving experts and target users to provide input on the design model. The urgency of this research lies in the fact that the steps involved in the curriculum adaptation model, particularly the pre-assessment are often perceived as burdensome, time-consuming, and complex. Teachers need a more efficient way to conduct assessments, obtain detailed analytical results quickly without excessive effort, and receive practical recommendations for curriculum adaptation. This research addresses these needs, which represents its novel contribution.

Keywords: Curriculum adaptation; Inclusive Education; decision support system.

INTRODUCTION

Inclusive education in Indonesia become a hot issue that is often discussed. However, the meaning of inclusive is still interpreted superficially. This meaning is limited by combining students with special needs to study with "normal" students in regular schools. Unsurprisingly, there is a culture called "inclusive student" for students with special needs in the school (Andini et al., 2020; Andriana & Evans, 2020). Many findings in the field still apply a pull-out system or study separately in a special room, and special student assistance creates exclusivity in the inclusive implementation (Loreman, Deppeler, & Harvey, 2010; Wijastuti et al., 2020). This shallow understanding makes the practice of inclusive education combine students with special needs without the flexibility of the education system. Then, if a student cannot achieve what is targeted, they will learn separately from their friends (Aprilia, 2017; Sunanto, 2016). It will make students feel burdened, different, pressured, and separated from their other friends (De Verdier, 2016). Then, inclusive education aims to provide equality, eliminate exclusivity, believe that all students can learn together, and welcome diversity by providing access and accommodation. So each student can achieve the achievements based on their potential and abilities and also pays attention to their learning needs (Andini, 2014; Lisdiana et al., 2019; Salamanca, 1994; Sunanto, 2016; Tomlinson, 2000)

Acknowledgments and positive views on diversity are still verbal and have not been implemented (Wijastuti, Masitoh, Aini, et al., 2020). Uniformity is still highlighted, it has not paid attention to the different characteristics of students (Lisdiana et al., 2019; Wijastuti, Masitoh, Aini, et al., 2020; Wijastuti, Masitoh, Ainin et al., 2020). That statement requires that students in inclusive education must accommodate all students regardless of their

physical, intellectual, social-emotional, language, or other conditions. It should include students with disabilities and gifted students, street children and working children, students from remote areas, students from minority ethnic, linguistic, or cultural minorities, and students from disadvantaged areas or marginalized (Salamanca, 1994).

Eliminating discrimination and stigma and providing equal opportunities to everyone are the basic principles and objectives of inclusive education (Ainscow, 2014; Booth, T., & Ainscow, 2002). Positive and open-minded toward inclusive education and acceptance of diversity are important points in the success of an inclusive education system (Fiona et al., and; Shevlin et al., 2013; Thomassen & Munthe, 2020; Tyagi, 2016). It is proven by several journals that examine the attitudes and views of all residents, including teachers. Teachers' perceptions and understanding of diversity and receiving diversity as a strength and challenge will create enthusiasm and indirectly increase teacher competence (Lee et al., 2015; Pantić & Florian, 2015; Sannen et al., 2021). However, the reality in the field has not invited all the diversity in the class to participate actively. The inclusiveness principle can eliminate barriers and provides an accommodation or alternative learning. So all students can learn and take their achievements according to their competencies. However, it is still not appropriately fulfilled and become a challenge (Spörer et al., 2020). Some teachers consider that the classroom's diversity will burden the teacher and add extra work (Andini et al., 2020). Inclusive is giving equal rights and eliminating differences (Ainscow, 2014).

All students can learn but have different classroom learning abilities and ways. A teacher must know each student's ability level before giving instruction (Andini, 2016; Tomlinson, 2000). The classes characterized by cultural and linguistic diversity demand a variety of strategies to differentiate teaching so that the diverse and many needs of students are met (Arends, 2007). In 2018-2019 a curriculum adaptation model was developed to help teachers and provide guidelines that can ease teachers to adapt the curriculum and design learning programs in the classroom. It is applied by considering the characteristics and learning needs of students who differ in readiness, interest, learning styles, and student learning modalities level. Then, it also provides direct experience in conducting trials and implementing learning tools to meet the diversity of students in the class.

The search results related to implementing the curriculum adaptation model found that 92.9% of teachers said that this model assisted in implementing learning in the classroom to meet students' learning needs. However, the curriculum adaptation model developed aims to assist teachers in meeting the learning needs by assessing student characteristics based on readiness, interest, learning styles, and learning modalities seen as an additional workload. The teacher must conduct an initial assessment to reveal student characteristics, which is thought to take a long time and is troublesome (Andini et al., 2020).

Based on the problems that arise, it becomes a challenge to develop a curriculum adaptation model that is more efficient and attractive in assisting the implementation of inclusive education that can pay attention to student characteristics through assessment. The assessment is used to reveal the needs and characteristics of students and is the basis for developing learning that can fulfill the learning needs of all students (Budingsih, 2015). Moreover, it was found that of the 175 teachers who had implemented the curriculum adaptation model in DI Yogyakarta. Then, more than 90% of the teachers had devices and internet access, 93.6% of teachers had laptops or computers at home, and 97.7% had an internet network; although 53.2% of the network in their area is slow, not all networks can be accessed properly. The majority of 70.5% of teachers are proficient in operating computers. Meanwhile, related to the technology application system teachers use is WhatsApp, with data of 86.7%, 12.1% of teachers use the Google Classroom application,

and 1.2% take advantage of the availability of websites developed by schools/institutions (Andini et al., 2021). It is necessary to apply technology applications that will help teachers get to know and understand the student characteristics and make decisions in determining the curriculum adaptation to be carried out. The application system developed focuses on the assessment process. So the difficult process and requires a long time will be assisted by technology applications in analyzing them. The teachers will easily make decisions in determining curriculum adaptation in the form of modifications and or accommodations.

METHOD

The research method used in this study is Research and Development (R&D). The development design follows the 4D model (Four D-Models), consisting of the following stages: (1) Define, (2) Design, (3) Develop, and (4) Disseminate (Lawhon, 1976). Data collected during the define stage are analyzed and used as the basis for developing a prototype of a curriculum adaptation model designed to effectively assist teachers by incorporating Decision Support System (DSS) technology.

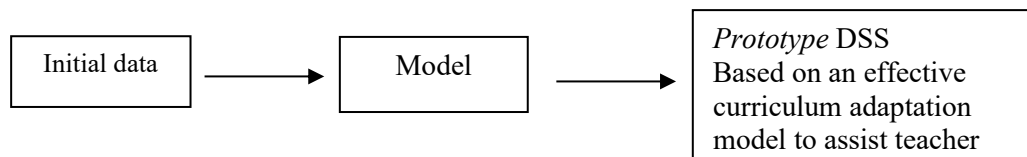


Figure 1. Stage of Design

The second stage, Design, focuses on system development and includes designing, building, and implementing a new or improved system. This study aims to refine or develop a system to be more efficient, effective, engaging, and responsive to user needs. The system development process includes the following steps:

1. Needs Analysis: This step involves gathering information about the requirements of the system and the needs of users, business owners, and other stakeholders.
2. Design: Based on the needs analysis, this stage involves planning the system structure, selecting appropriate technologies, and designing the user interface.
3. Development: This stage involves building the system according to the established design, using specific programming languages, development tools, and necessary technologies.
4. Testing: The system is tested to ensure it functions properly and meets user requirements.
5. Implementation: Once testing is complete, the system is deployed or released into the production environment.
6. Maintenance: After implementation, the system is maintained to ensure it remains functional, secure, and continues to meet user needs.

System development is a complex process that requires effective team collaboration. Its goal is to produce a system that is accurate, beneficial, and efficient for users and stakeholders.

FINDING AND DISCUSSION

Finding

The development process utilizes a Decision Support System (DSS)-based application and transforms a manual guide into a technology-based system. This development is based on an existing guide that has been designed, implemented, and further developed into a decision support technology system. The product is expected to assist teachers in identifying the diverse characteristics of students, determining appropriate forms of curriculum adaptation, and translating them into lesson plans (RPP). As a result, it is anticipated that this system will also help reduce teachers' administrative workload. The following is a simplified overview of the development process.

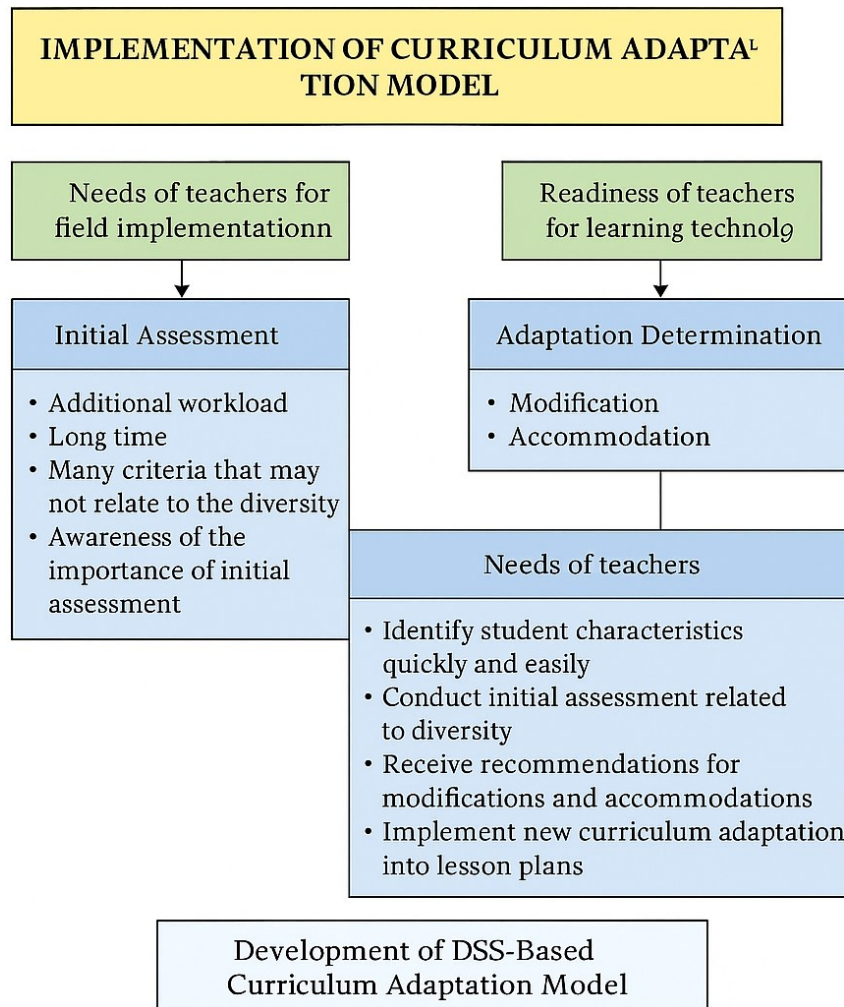


Figure 2. The Implications of the Results from the Definition Phase

Discussion

Decision Support System

The classic definition for a DSS is a computer-based decision support system for management decision-makers that deals with unstructured problems. DSS combines intellectual resources from individuals with computer capabilities to improve computer quality, according to Kreen and Scoot Morton, who was followed by (Hizqil, 2014).

Kendall & Kendall, 2010 wrote that a decision support system (DSS) is one way of organizing intended to be used in making decisions. Decision support systems are designed

in such a way as to help support decisions involving complex problems that are formulated as semi-structured problems.

Decision Support System (DSS) is a system that assists decision-making in an organization by providing relevant information and analytical tools to solve complex problems and assist users in choosing the best alternative from the various options. DSS can help users to analyze and process data, model and simulate situations, and provide suggestions or recommendations for decision-making. DSS can assist with many decisions, including business, investment, marketing, and management decisions.

The Purpose of Decision Support Systems

According to Turban et al., cited by (Amelia Yusnita, 2015) state that the purpose of a decision support system is as follows:

- a. Assist managers in making decisions on semi-structured problems.
- b. Support the manager's decision, but it is not intended to replace the manager's function.
- c. Improving the effectiveness of managers' decisions is better than improving efficiency.
- d. Computing speed. Computers enable decision-makers to quickly perform large amounts of computation at a low cost.
- e. Productivity improvements. Building a group of decision-makers, especially experts, will be very expensive.

Computerized support can reduce group size and allow members to be in multiple locations (saving on travel costs). In addition, the productivity of support staff (e.g., financial and legal analysis) could be increased. Productivity can also be increased using optimization tools to determine the best way to run a business or other interests.

Comparison of Decision Support System Methods

According to (Ashvia, Achta, 2015), several methods exist for completing decision support systems. The following are several methods that use multi-attribute decision-making (MADM):

- a. *Analytical Hierarchy Process (AHP)*
- b. *Simple Additive Weighting (SAW)*
- c. *Weighted Product (WP)*
- d. ELECTRE
- e. *Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)*

The decision support system used in curriculum adaptation in this study is the Analytical Hierarchy Process (AHP).

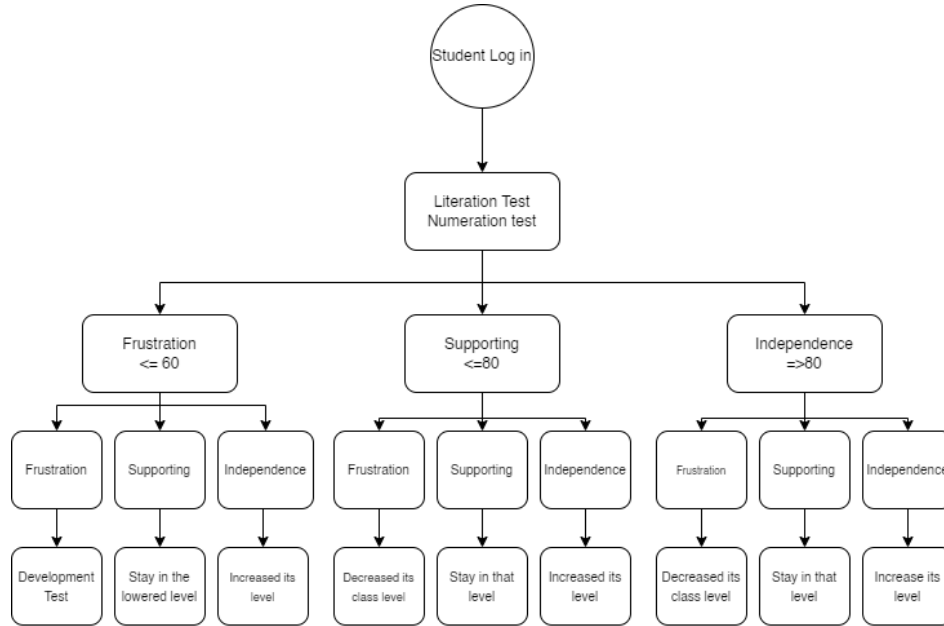


Figure 3. The Analytical Hierarchy Process (AHP) method in the Decision Support System used

The decisions taken from the literacy or numeracy test results resulted from 2 tests done by the students. The score results become the main consideration in deciding what stage students should be grouped into three terms. The term is independent, assisted, and frustrated. Students are categorized as independent if the results of the tests that have been done are more than or equal to 80. Then, students are considered assisted if the test results are more than or equal to 60 and less than 80. The last, students are considered to be frustrated if the test results are less than 60.

The first test is carried out at the grade provided by the taught curriculum. For example, in grade 4 Theme 4, the results of this literacy or numeracy test will be categorized by the system into the three groups above (Independent, Assisted, and Frustrated). Then the second test is repeated to confirm whether the results are valid. After the results come out, the system will provide several decisions in the form of descriptive text and must be implemented by the teacher

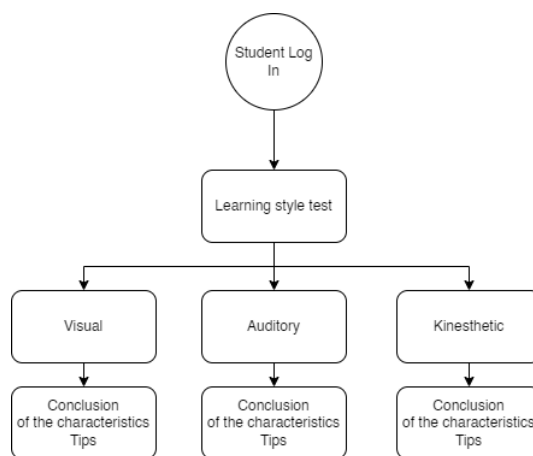


Figure 4. AHP method in learning style

This learning style test is carried out to determine teacher considerations in determining learning strategies, models, methods, and media based on student learning styles. All those students have to do is complete the learning style tests. This test is optional. There is no right or wrong answer. The system's learning style will determine the result of the choice. Each test performed may not produce the same results. This learning style test is categorized into three groups: visual, auditory, and kinesthetic. Each learning style test result will display some information, namely conclusions, characteristics, and teacher tips.

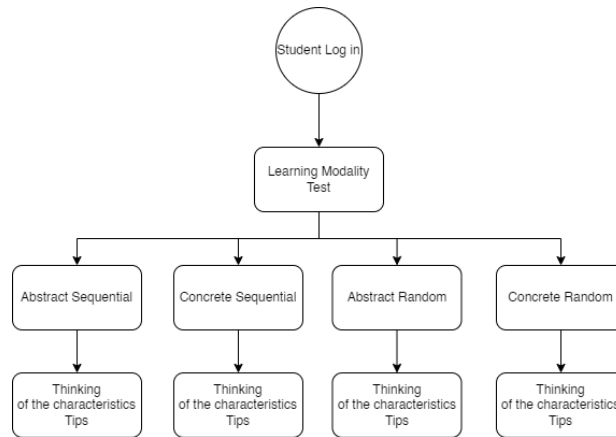


Figure 5. AHP method in learning modality

The teacher uses this student learning modality test to determine the student's initial modality. According to experts, modalities are grouped into four categories: Abstract Sequential, concrete sequential, abstract random, and concrete random. Each of these categories has its unique thinking style. After students complete the learning modality test, the system will display some information through descriptions/thought characteristics and tips for teachers.

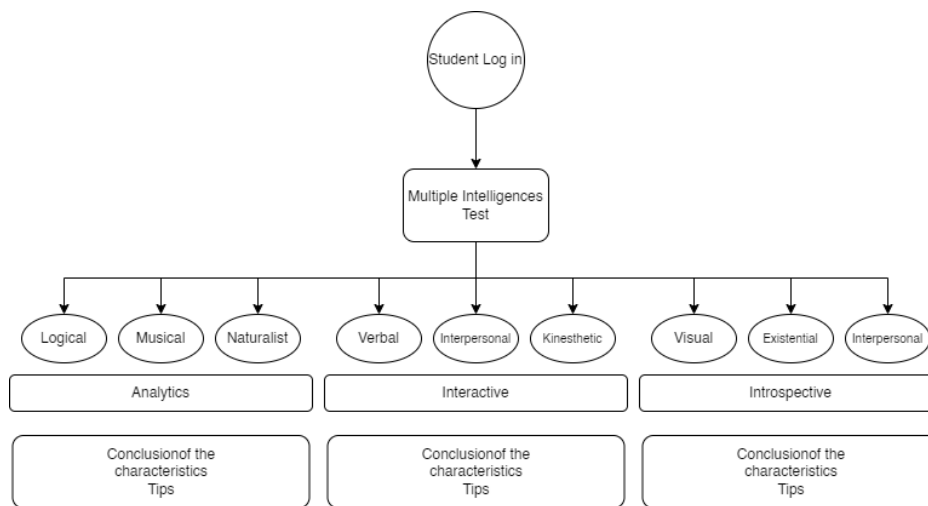


Figure 6. AHP method in multiple intelligence

This multiple intelligence test is used to identify students' intelligence tendencies. The test results are taken for the three highest scores and displayed in interactive graphical form. So, it can ease the teacher's decisions about what kind of learning will be carried out. This multiple intelligence has three major groups: Analytical, interactive, and introspective. Each group has sub-groups (logical, musical, naturalist, verbal interpersonal, kinesthetic, visual, existential, interpersonal). Then, students may have other intelligence outside the intelligence groups categorized, such as logical, musical, and visual. Logical and musical are in the analytical group, while visual is in the introspective group.

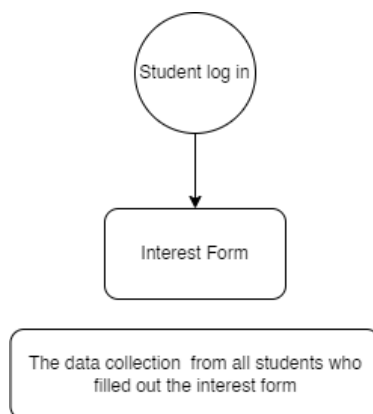


Figure 7. AHP method in interest

This interest form test looks the simplest in deciding. This form is only specifically for recording the information filled in the form and then entering it into the database and display without categorical considerations like in the previous test. After students fill in some questions given by the system, the system will immediately display them on the teacher's dashboard, which can be used as additional information for the teacher. So they can determine strategies, models, methods, and learning media that will be used in the learning process in class.

CONCLUSION

All students can learn but have different classroom learning abilities and ways. A teacher must know each student's ability level before giving an instruction. A curriculum adaptation model has been developed, which is a solution to helping teachers meet the diversity of students in the classroom. However, implementing this model is seen as an additional workload. The teacher must conduct an initial assessment to reveal the characteristics of students who feel felt to takes a long time and is troublesome. It also makes determining curriculum adaptation, modification, or accommodation difficult. The urgency in developing a more efficient and attractive curriculum adaptation model needs to be done immediately so that inclusive education can be implemented.

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