International Journal of Educational Review, Law & Social Sciences (IJERLAS)
International Journal of Educational Review, Law And Social Sciences (IJERLAS Journal) | ISSN(e): 2808-487X
Volumes 5 No. 4 (2025)

APPLICATION OF ADAPTIVE LEARNING MODEL TO FINE MOTOR DEVELOPMENT IN EARLY ELEMENTARY SCHOOL CHILDREN

Hendri
Pendidikan Guru Sekolah Dasar, Universitas Doktor Nugroho, Magetan, Indonesia
hendri@udn.ac.id[1]
Author Corespending: hendri@udn.ac.id

Received : 30 June 2025
Revised : 10 July 2025
Accepted : 25 July 2025
Published : 31 July 2025
DOI : https://doi.org/10.54443/ijerlas.v5i4.3838
Link Publish : https://radjapublika.com/index.php/IJERLAS

Abstract

This study aims to describe the application of adaptive learning models to the fine motor development of early elementary school students. This study uses a qualitative approach with a descriptive method. The subjects of the study were teachers and students of grade I at one of the State Elementary Schools. Data collection techniques are carried out through observation, interviews, and documentation. The results of the study showed that teachers applied adaptive learning by adjusting learning activities to the motor abilities of each student. The learning activities used include tracing, scissors, scissors, gluing, and folding, which directly train eye-hand coordination and finger muscle strength. The application of adaptive learning has been proven to be effective in improving students' fine motor skills, which can be seen from the improvement of their work results and coordination of movements. Despite several obstacles, such as limited tools and differences in students' abilities, teachers are able to overcome them with creative strategies. Adaptive learning is becoming a relevant approach to apply in early grade education because it encourages the overall physical and cognitive development of students.

Keywords: ***Adaptive Learning, Fine Motor, Early Grade Students, Qualitative Approach, Active Learning***

INTRODUCTION

Basic education is a very important initial stage in forming the foundation of children's abilities, both from cognitive, affective, and psychomotor aspects (Marsini, 2023c). At this stage, children are in a period of very rapid growth and development, especially in terms of motor skills. One type of motor that plays an important role in early childhood is fine motor skills, because they are directly related to children's learning activities such as writing, drawing, and cutting (Marsini, 2023b). Fine motor refers to the ability of children to control small muscles, especially those in the fingers and hands (Marsini et al., 2022). This ability develops as children get older and experienced, and is influenced by the learning environment provided. According to (Hurlock, 1997), "Fine motor development is an integral part of a child's physical development that determines their success in daily activities, especially learning activities at school." In the early classes of elementary school, the mastery of fine motor skills is one of the indicators of learning readiness. Children who have good fine motor development tend to have an easier time participating in learning activities, especially those that require eye and hand coordination (Dwikoranto et al., 2023).

In contrast, children who experience fine motor impairment may have difficulty completing academic tasks. The learning model applied by teachers greatly affects the extent to which stimulation of children's fine motor skills can be provided optimally (Marsini, 2023a). The adaptive learning model, which is a model that adjusts the approach to the conditions and needs of students, is one of the strategies that can be used to support this development. (Slavin, 2018) states that "Effective learning is learning that is able to adapt to the individual needs of students, including in terms of their physical and motor development." The early elementary classes have unique characteristics of students, who are still very active, exploratory, and learn through hands-on experience. Therefore, the learning approach cannot be carried out uniformly, but must be responsive to the needs and abilities of children. This is in line with Piaget's opinion (Santrock, 2011) that early childhood is at the pre-operational stage, where learning must be concrete and activity-based. The application of adaptive learning models in the context of fine motor development includes organizing learning activities that allow children to use their hands in meaningful activities. For example, through free drawing, playing plasticine, meronce, cutting, and folding. These activities are not only fun, but also give children

space to work on their hand muscle strength and coordination. Teachers as facilitators in the learning process have a central role in designing learning activities that not only meet curriculum targets, but also pay attention to aspects of child development (Marsini, 2025). Learning that emphasizes too much on cognitive aspects without paying attention to children's motor readiness can have an impact on low learning achievement and motivation of children. Adaptive learning models can also bridge the needs of children with different levels of motor development (Marsini, 2023d). In one class, there are often variations in children's abilities, both motor and cognitive. Therefore, this model helps teachers not to be fixated on just one method, but to be more flexible in using various appropriate approaches. One of the approaches that is often used in the adaptive learning model is the activity-based learning approach. This approach encourages children to learn through hands-on experience and the use of concrete aids that can stimulate their fine motor development. As stated by (Bruce et al., 2013), "Children are actively learning and they need to engage in physically and mentally challenging activities."

The success of adaptive learning in supporting fine motor development also depends heavily on conducive classroom management and the use of appropriate learning media. Media such as puzzles, buttons, colorful stationery, and recycled materials can be a means to stimulate children's hand skills while increasing their involvement in learning. In addition, it is also important to evaluate fine motor development on a regular basis. Teachers need to have an understanding of the indicators of fine motor development that are appropriate for the child's age, in order to identify development and obstacles that may occur. This is the basis for adjusting the next learning strategy. According to (Berk, 2015), "Each child develops at their own pace, but a supportive environment and the right learning methods can accelerate the development of children's motor skills." Therefore, the adaptive learning model is a solution so that the learning process in the early classroom is more inclusive and effective. It is also important for teachers to integrate thematic learning with fine motor activities, so that children not only gain cognitive knowledge, but also develop their physical skills at the same time. For example, when the theme of the lesson is "Animals," children may be asked to create animal shapes out of folding paper or draw their favorite animals.

In addition to teachers, the role of parents and the home environment also affect the extent to which children's fine motor skills develop. However, as the place where children spend most of their time, schools have a great responsibility to provide holistic and adaptive learning activities. In the era of the Independent Curriculum that emphasizes differentiated learning, adaptive models are becoming increasingly relevant to be applied (Anggraini et al., 2022). Learning is no longer uniform and based solely on value targets, but is oriented to the needs, interests, and abilities of each student. The application of the adaptive learning model to children's fine motor development is also in line with the principles of early childhood development, namely learning that is fun, not forceful, and provides space for exploration. This makes children feel comfortable and motivated to learn. This study aims to examine how the application of adaptive learning models is able to support the fine motor development of early elementary school students, as well as identify the obstacles faced by teachers in its implementation. With a deeper understanding of the importance of adaptive learning for fine motor development, it is hoped that teachers can design more effective and contextual learning strategies. This will have a direct impact on the quality of the teaching and learning process in elementary schools. Learning that pays attention to the overall aspects of child development, including fine motor skills, will help create a generation that is not only intellectually intelligent, but also skilled and ready to face the challenges of life in the future. Therefore, this research is important to be carried out in order to make a real contribution to educational practices in the early grades, as well as to add references in the development of learning models that are more adaptive, humanist, and centered on children's needs.

RESEARCH METHODS

This study uses a qualitative approach with a descriptive type of research. The qualitative approach was chosen because this study aims to understand in depth how the application of adaptive learning models can affect the fine motor development of early elementary school students. According to (Moleong, 2017), qualitative research is research that intends to understand the phenomena of what the research subject experiences, such as behavior, perception, motivation, action, and so on holistically, and by way of description in the form of words and language, in a specific natural context. This research was carried out in one of the State Elementary Schools in Magetan Regency. The location was chosen based on the consideration that the school has implemented adaptive learning and has characteristics of early grade students that are in accordance with the focus of the research. The subjects in this study are early grade teachers (class I or II), as well as several students who are the focus of observation. Teachers are chosen as the main informants because they are direct actors in the planning and implementation of the learning model in the classroom. Meanwhile, early grade students were made subjects of observation to see how their responses and fine motor development during the learning process took place. Data collection was carried out using several main techniques, namely observation, interviews, and documentation. Observation is carried out directly in

the classroom to observe learning activities and forms of activities related to fine motor skills, such as coloring, knitting, scissors, and writing. This observation is passive participatory, where the researcher is present in class but does not participate in learning activities (Jogiyanto Hartono, 2018). Interviews were conducted in a semi-structured manner with classroom teachers and several students to obtain information about the implementation of adaptive learning, challenges faced by teachers, and the progress observed in students. Interviews with teachers were conducted in depth to explore the learning strategies used and the reasons for choosing certain methods. Meanwhile, interviews with students are adjusted to the child's language ability and age so that they can be understood well. Documentation is used to support observation and interview data, in the form of photos of learning activities, student worksheets, and lesson plans (RPP) used by teachers. This data is useful to strengthen the analysis of the form of learning adaptation and the results of students' fine motor development.

The data analysis in this study was carried out using interactive analysis techniques according to (Miles & Huberman, 1994), which includes three main stages, namely data reduction, data presentation, and conclusion drawn. Data reduction is carried out by compiling and sorting data according to the focus of the research. The presentation of data is carried out in the form of narrative descriptive so that it is easy to understand and analyze further. Conclusions are drawn continuously throughout the research process until valid and relevant findings are obtained. To ensure the validity of the data, source triangulation techniques and techniques are used. Source triangulation was carried out by comparing data from observations, interviews, and documentation. Meanwhile, triangulation techniques are carried out by combining various data collection methods to see the consistency of the information obtained. In addition, member checks are also carried out on teachers to ensure that the results of the researcher's interpretation are in accordance with the reality in the field. By using this approach, it is hoped that the research will be able to provide a complete and in-depth picture of the application of the adaptive learning model and its influence on the fine motor development of early grade students. The results of this research are also expected to be input for teachers and schools in developing learning strategies that are more responsive to the needs of early childhood development.

RESULTS OF RESEARCH AND DISCUSSION

1. Application of Adaptive Learning Models in Early Childhood

Based on the results of observations and interviews, grade I teachers have applied an adaptive learning approach by adjusting learning activities to the needs and abilities of each student. Teachers design activity-based learning that emphasizes students' fine motor involvement, such as scissors, pasting, writing letters, and making collages. In the interview, the teacher said that not all students have the same fine motor development. Some students seem proficient in holding stationery and cutting neatly, while others still seem stiff and have difficulty controlling hand movements. Therefore, teachers group students based on abilities and assign tasks that vary according to their respective levels of development. For example, when the activity is attached to geometric shapes, students who are already proficient are given the task of making their own patterns, while students who are still having difficulty are given a pattern that has been prepared as a guide. This shows the application of differentiated learning as part of an adaptive model. The findings in this study show that early grade teachers have implemented adaptive learning models quite well. Teachers arrange learning based on the needs and abilities of each student. This is in line with the opinion (Slavin, 2018) which states that effective learning is learning that is able to adapt to the individual needs of students. In the context of early elementary school, the diversity of developmental levels, especially in terms of fine motor skills, is a challenge as well as a reason for the importance of flexible and responsive learning. The application of adaptive learning in the classroom also reflects a differentiated learning approach, where teachers pay attention not only to academic achievement, but also aspects of students' physical development, such as the ability to use stationery, scissors, and other manipulative materials. Teachers give students space to choose a learning style that suits their style and pace, so that every child feels involved and motivated to follow the learning.

2. Forms of Learning Activities that Support Fine Motor

Teachers integrate fine motor activities in thematic learning. These activities are not only carried out in cultural arts and crafts lessons, but also in Indonesian, mathematics, and even PPKn lessons. Activities such as tracing letters, making word cards, beading beads, and matching letters using plastic needles are often carried out as variations in the learning process.

Table 1. The learning activities used by the teacher and the fine motor aspects that are stimulated

Yes	Types of Activities	Learning Objectives	Fine Motor Aspects Trained
1	Plagiarizing letters	Practice writing letters correctly	Eye–hand coordination, finger flexibility
2	Cutting patterns	Get to know shape and size	Hand muscle control, movement precision
3	Meronce beads	Getting to know the sequence and color patterns	Finger coordination, precision
4	Paste the image	Constructing a story from images	Movement planning, object placement
5	Folding paper (origami)	Getting to know simple geometric shapes	Precision movement, focus power

The teacher also emphasized the importance of media variety. In the documentation, it was found that the use of materials such as plastic, ice cream sticks, colored paper, and flannel cloth to help students create motorically. Students show high enthusiasm when activities are carried out in person and involve their hands. Various activities designed by teachers such as tracing, cutting, folding, pasting, and meronce showed that teachers had integrated fine motor activities into the learning process. These activities concretely train eye and hand coordination and strengthen the small muscles of the fingers and wrists, which according to (Hurlock, 1997) is an important part of a child's physical development that affects their success in school. The use of varied learning media is also a form of the activity-based learning principle presented by (Bruce et al., 2013), that children learn actively through real physical and mental experiences. Teachers do not only give tasks that are symbolic or abstract, but involve students in the learning process through direct contact with tools and materials. This is important for children of early grade age who according to Piaget (Santrock, 2011) It is still in the pre-operational stage, where learning is more effective if it is based on concrete and exploratory.

3. Students' Fine Motor Development after the Implementation of Adaptive Learning

Through observation and analysis of student work results before and after a few weeks of adaptive learning was implemented, there was a significant improvement in students' fine motor skills. Students who initially had difficulty holding scissors or writing letters correctly gradually began to show better skills, both in terms of control, precision, and hand strength.

Table 2 Comparison of Students' Fine Motor Development (Before and After 4 Weeks of Adaptive Model Application) on Several Key Indicators

Fine Motor Indicator	Before (%)	After (%)	Information
Write neatly	42%	71%	Significant improvement
Cutting to pattern	35%	68%	Noticeable improvement in cutting precision
Meronce with a neat sequence	48%	76%	Improved in terms of finger coordination
Folding simple patterns	50%	79%	Improved precision and focus skills

The improvement of students' fine motor skills after the implementation of adaptive learning shows that this strategy has a real positive impact. Students who previously had difficulty cutting, writing, or folding, gradually showed significant progress. This supports the opinion (Berk, 2015) that each child does develop at their own pace, but a supportive learning environment and the right teaching methods can accelerate the developmental process. The improvement of students' fine motor skills is also proof that learning designed by paying attention to the stages of children's development is able to produce meaningful changes. The use of adaptive learning models not only helps children achieve cognitive achievements, but also supports psychomotor aspects that become the foundation for the next learning process. The application of adaptive learning has also been proven to be able to create a fun and non-stressful learning atmosphere, as affirmed in the principles of the Independent Curriculum which prioritizes differentiation, flexibility, and student activeness in learning. Children are more engaged, motivated, and enthusiastic when learning activities are tailored to their interests and abilities, especially if they involve the exploration of tools and movements.

4. Obstacles and Solutions in the Application of Adaptive Learning

In the interview, the teacher conveyed several obstacles faced, including limited time in preparing various learning media, the lack of supporting facilities such as teaching aids and consumables, and the wide difference in the level of students' abilities in one class. Teachers also recognize that managing the classroom with an adaptive approach requires high energy and creativity. However, teachers overcome this with collaborative strategies, such as asking students' parents for help to provide certain materials, utilizing used items as creative media, and conducting regular reflections to evaluate the effectiveness of the approach used. Although the application of the adaptive learning model has yielded positive results, teachers still face various obstacles in its implementation. Constraints such as limited teaching aids, variations in student development levels, and more complex planning demands are challenges in themselves. However, teachers showed creativity and resilience in overcoming these obstacles, including by utilizing used goods as a learning medium and involving parents in providing simple materials. Teachers' efforts to continuously reflect and evaluate the learning process show that the implementation of adaptive learning requires commitment and a deep understanding of the characteristics of students. This is in line with the role of teachers as facilitators who not only deliver material, but also create learning conditions that allow each child to develop optimally, both cognitively and motorically. Thus, adaptive learning can be a very relevant approach to apply to early grade students, especially in supporting their fine motor development. In addition to having an impact on the psychomotor aspect, this approach is also able to build confidence, independence, and emotional involvement of students in learning activities.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the application of an adaptive learning model to the fine motor development of elementary school students has a significant positive impact. Teachers who apply an adaptive approach are able to adapt learning activities to the needs and abilities of each student, especially in terms of fine motor coordination such as writing, cutting, gluing, folding, and folding. The adaptive learning model allows teachers to use a wide variety of methods and media that stimulate students' hand skills. This is in line with the theory of child development which emphasizes the importance of learning based on concrete activities, according to the pre-operational developmental stage according to Piaget. Learning that is designed flexibly and responsively is found to be able to increase students' engagement and motivation to learn, while accelerating the development of their fine motor skills. The results of the study showed that there was an improvement in students' fine motor skills in several indicators, such as the ability to write neatly, cut according to patterns, and arrange objects with order. This improvement is not only evident from the students' work, but also from the observation of their behavior and hand coordination during the learning process. Thus, it can be concluded that the adaptive learning model is an effective strategy to be applied in the early grades, because it is able to create learning that is inclusive, fun, and in accordance with the characteristics of students. Although there are several obstacles in its implementation, such as limited media and differences in abilities between students, teachers can overcome them with creativity, cooperation with parents, and good classroom management. Therefore, learning that is adaptive to fine motor development deserves to be continuously developed and made part of sustainable learning practices, in order to support the creation of holistic and meaningful basic education.

REFERENCES

Anggraini, D. L., Yulianti, M., Nurfaizah, S., & Pandiangan, A. P. B. (2022). Peran guru dalam mengembangan kurikulum merdeka. *Jurnal Ilmu Pendidikan Dan Sosial*, *1*(3), 290–298.

Berk, L. (2015). *Child development*. Pearson Higher Education AU.

Bruce, T., Meggitt, C., & Grenier, J. (2013). *Child care and education*. Hodder Education.

Dwikoranto, D., Suliyanah, S., Sucahyo, I., Kholik, A., Sukarni, S., Marsini, M., & Setiani, R. (2023). Desain Lembar Kegiatan Siswa (LKS) Berorentasi Pada Pendekatan Saintifik Bagi Guru Sekolah Dasar. *Jurnal Inovasi Penelitian Dan Pengabdian Masyarakat*, *3*(1), 44–54. https://doi.org/10.53621/jippmas.v3i1.207

Hurlock, E. B. (1997). *Psikologi perkembangan: suatu pendekatan sepanjang rentang kehidupan.*

Jogiyanto Hartono, M. (2018). *Metoda pengumpulan dan teknik analisis data*. Penerbit Andi.

Marsini, M. (2023a). Analisis Model Pembelajaran Snowball Throwing pada Mata Pelajaran IPS Siswa Kelas I di SDN Ngujung 2. *Journal of Education Humaniora and Social Sciences (JEHSS)*, *6*(1), 8–15. https://doi.org/10.34007/jehss.v6i1.1795

Marsini, M. (2023b). Motivasi Belajar Siswa pada Pembelajaran IPS di SDN Kraton VI Maospati. *Jurnal Educatio*

FKIP UNMA, *9*(1), 302–309.
Marsini, M. (2023c). Pengaruh Penggunaan Metode Proyek Pada Mata Pelajaran IPS di SDN Ngujung 2 Kabupaten Magetan Terhadap Prestasi Belajar Siswa Kelas IV. *Indonesian Journal of Social Science Education (IJSSE)*, *5*(2), 104. https://doi.org/10.29300/ijsse.v5i2.4016
Marsini, M. (2023d). The Effectiveness of the E-Library as a Learning Resource for Elementary School Students' Social Studies in Improving Literacy Skills. *AL-ISHLAH: Jurnal Pendidikan*, *15*(3), 3726–3736.
Marsini, M. (2025). Empowering young minds: Transforming social studies education to foster digital ethics in elementary schools. *Jurnal Civics Media Kajian Kewarganegaraan*, *22*(1). https://doi.org/10.21831/jc.v22i1.1352
Marsini, M., Rukayah, R., & Dahlan, M. (2022). Model Problem Based Learning Dapat Meningkatkan Hasil Belajar SDN 1 Pangkalan Tiga. *Pinisi Journal Pendidikan Guru Sekolah Dasar*, *2*(2), 659. https://doi.org/10.70713/pjp.v2i2.29627
Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook, 2nd Edition* (2nd ed.). Sage Publications.
Moleong, L. J. (2017). *Metode Penelitian Kaulitatif*. PT Remaja Rosdakarya.
Santrock, J. W. (2011). *Educational psychology*. McGraw-Hill.
Slavin, R. E. (2018). *Educational psychology: Theory and practice*. Pearson.