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Needs Analysis the Development of Ethnoscience-Based Batik (Ethnostik) on Material Changes Form in Elementary School

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ABSTRACT
This research is motivated by the existence of traditional knowledge and local wisdom which is threatened with extinction amidst the current of modernization and globalization. The shift of local cultural values in the field of education has created a need for teaching materials to increase students' love for local culture in Indonesia. This research aims to evaluate the shortcomings in the use of existing teaching materials in the field, determine teachers' understanding of ethnoscience, describe the experiences of teachers using ethnoscience-based teaching materials, and analyze the urgency of developing batik ethnoscience-based teaching materials (Ethnostics) in elementary schools. The design of this research is R & D (Research and Development) using a 4D model and is only limited to the first stage, namely defining. The subjects taken in this research were 6 grade 4 teachers from 5 elementary schools, namely SDN 04 Lempong, SDN Telukan 02, SDN Gelaran 1, SD 06 Al Islam Al Fajar Surakarta, SDIT Nurul Huda Pracimantoro. Data collection techniques using questionnaires and interviews. Data analysis uses descriptive analysis techniques. The validity of the data was tested using source and technical triangulation techniques. The results of this research show that there are deficiencies in the use of teaching materials in terms of material and practical aspects, teachers' understanding of ethnoscience is still not perfect, the application of ethnoscience-based teaching materials by some teachers has a positive impact on students, and it is necessary to develop teaching materials based on changing the shape of objects, ETHNOSTICS for grade 4 elementary/MI students.
***Keywords**: Teaching Materials; Ethnoscience; Batik*

ABSTRAK
Penelitian ini dilatarbelakangi adanya pengetahuan tradisional dan kearifan lokal yang terancam punah di tengah arus modernisasi dan globalisasi. Tergesernya nilai-nilai budaya lokal pada bidang pendidikan memunculkan adanya kebutuhan terhadap bahan ajar untuk meningkatkan rasa cinta siswa terhadap budaya lokal di indonesia. Penelitian ini bertujuan untuk mengevaluasi kekurangan penggunaan bahan ajar yang ada di lapangan, mengetahui pemahaman guru tentang etnosains, menjabarkan pengalaman penggunaan bahan ajar berbasis etnosains oleh guru, dan menganalisis urgensi pengembangan bahan ajar berbasis Etnosains batik (Etnostik) di Sekolah Dasar. Desain dari penelitian ini adalah R & D (Penelitian dan Pengembangan) dengan menggunakan model 4D dan hanya terbatas pada tahap pertama yaitu mendefinisikan. Subjek yang diambil pada penelitian ini

sebanyak 6 guru kelas 4 dari 5 SD yaitu SDN 04 Lempong, SDN Telukan 02, SDN Gelaran 1, SD 06 Al Islam Al fajar Surakarta, SDIT Nurul Huda Pracimantoro. Teknik pengumpulan data dengan menggunakan angket dan wawancara. Analisis data menggunakan teknik analisis deskriptif. Keabsahan data diuji dengan penggunaan teknik triangulasi sumber dan teknik. Hasil dari penelitian ini menunjukkan bahwa adanya kekurangan dalam penggunaan bahan ajar dalam aspek materi dan kepraktisan, pemahaman guru terhadap etnosains masih belum sempurna, penerapan bahan ajar berbasis etnosains oleh beberapa guru berdampak positif bagi siswa, serta perlu dikembangkannya bahan ajar pada materi perubahan wujud benda berbasis ETNOSTIK untuk siswa SD/MI kelas 4.
Kata Kunci: Bahan Ajar; Etnosains; Batik

INTRODUCTION

The changing times have caused local cultural values in Indonesia to be left behind (Sarini & Selamet, 2019). The rapid development of many foreign cultures in people's lives can cause the displacement of local cultural values in Indonesia. The developing foreign cultural values have an impact that results in no more love for the Indonesian homeland. Another impact related to the displacement of local cultural values is in education. For this reason, there needs to be a real effort to maintain local wisdom through education. In addition, it is also expected to increase students' insight into the culture that is developing in today's society (Desstya & Kurniawati, 2019).

Improving the current education system requires a more comprehensive development. It aims to integrate social dynamics into education (Sari & Siwi, 2018). Education is a significant element in determining the progress of a nation (Wiyono et al., 2021). Education is one of civilization's processes and a tool for cultural change (Sarini & Selamet, 2019). The holder of a vital role in creating quality human resources is education. Formal education or schools are essential for developing local cultural values (Intika & Jumiati, 2020). Students benefit from education by better preparing for future challenges (Pitri & Diliarosta, 2022). As a support for improving the quality of human resources, schools have become formal educational institutions where qualified human beings are expected to become the main foundation of a nation. With that, it is also expected to be able to compete with nations in this world. Supporting facilities and infrastructure are needed to improve the quality of education during the learning process in elementary schools, especially in the classroom (Wahyu et al., 2020). One example of facilities and infrastructure is teaching materials containing material updates that synergize with the cultural value of Indonesian local wisdom, such as batik.

Batik is one of Indonesia's many cultures and has its characteristics and personality. One example of batik famous in Indonesia comes from the city of Solo. One iconic Solo batik is located in Laweyan batik village in Laweyan (Kusumastuti et al., 2019). Batik is a symbol of national identity that serves as a means to educate people about culture and morals (Irawan et al., 2022). A sense of love for local culture, such as batik, must be instilled in students so that local culture remains strong until now (Saputri & Desstya, 2023). Batik can be an example of a topic in teaching materials whose use can increase students' love for local wisdom in Indonesia.

One of the critical roles in learning is using teaching materials (Magdalena et al., 2020). Teaching materials are used for teachers and students. In general, teaching materials contain facts, principles, procedures, and or concepts that are structured or systematic. The teaching material that both teachers and students often use is books (Budiwati et al., 2023). Teaching

materials contain knowledge that becomes an ongoing formation that will undergo changes or updates at any time due to the emergence of new understanding, one of which is related to local culture. The use of local wisdom in open materials helps students understand the material in a context that is close to their daily lives. This makes learning more relevant and meaningful. By incorporating elements of local wisdom into open materials, schools can play a role in cultural preservation. Students will better know, appreciate and maintain their local traditions and values.

Ethnoscience is an activity that transforms between indigenous science and scientific science (Ahmadi et al., 2019). Indigenous knowledge in the form of language, cultural norms, and morality, as well as technology developed by a group of people or a single individual that contains scientific knowledge, is known as ethnoscience (Sudarmin et al., 2017). Ethnoscience is also a strategy to create a learning environment by linking culture as part of the science learning process so that it is helpful for life (Widyaningrum & Prihastari, 2021). Ethnoscience is one of the efforts to make students more familiar with local wisdom (Widyaningrum, 2018). Ethnoscience-based learning will create learning activities that are more helpful and meet the objectives of learning implementation (Sayekti, 2019). Science learning allows students to explore the environment (Raven & Wenner, 2023). Permendikbud number 58 of 2014 states that every student or learner can apply science cleverly to preserve and maintain sustainability. Therefore, utilizing local wisdom in learning is essential (Utami et al., 2023). Learning equipped with ethnoscience teaching materials can increase a sense of love for the culture that exists in Indonesia. In addition, it can also advance local customs in certain areas (Azizah, Sukarno, 2023). Prospective teachers, especially science teachers, must master the skills in reconstructing local wisdom in the community (Parmin et al., 2022). Ethnoscience-based learning helps students recognize regional potential, increasing their understanding of culture. Additionally, this lesson teaches students to respect their friends who have different cultural backgrounds (Oktaviana et al., 2024).

However, in elementary schools, existing science teaching materials are generally monotonous, and local wisdom in Indonesia needs to be integrated. Due to this, students become bored quickly and consider learning science to be complex because it only contains theory (Sayekti, 2019). Furthermore, in this technological era, students are more familiar with foreign cultures than local cultures owned by the Indonesian nation. So that the sense of nationalism in students tends to fade. Students also need to learn about local culture. Instilling insights based on ethnoscience will prevent students from being alienated from their environment, culture and local wisdom which are now experiencing increasing changes due to the flow of globalization and technology (Setyowati et al., 2023). Ethnoscience-based teaching materials in elementary school not only help students understand scientific concepts, but also connect them with their cultural heritage, shaping their character.

Several studies have examined the development of ethnoscience-based teaching materials. The first is the development of ETNOSPEM (pempek ethnoscience) teaching materials on the science process skills of elementary school students (Intika & Jumiati, 2020). The study explains that ETNOSPEM teaching materials can be used as a tool in learning. Apart from that, there is research on ethnoscience studies in elementary school learning (Setyowati et al., 2023). This research aims to systematically, factually and accurately describe the application of ethnoscience in learning in elementary schools. Furthermore, in developing

ethnoscience-based science modules of additives in food ingredients for class VIII SMP Negeri 1 Pegandon Kendal (Rosyidah et al., 2013). Science modules based on ethnoscience additives in food can make students more active in learning.

As time and technology develop, science must also be developed. Knowledge development efforts are carried out not only by scientists and experts in their fields. More than that, the vital thing that needs to be applied is to explore the potential of science or science knowledge in the culture currently developing in society (Regina & Wijayaningputri, 2022). This can be addressed by applying learning and teaching materials that integrate ethnoscience. The ability to develop various teaching materials must be owned by teachers so that the learning that will be applied is varied and exciting for students (Rosyidah et al., 2013). Teachers must be ableto use their creativity more (Fahad & Sari, 2021). Based on this previous research, ethnoscience-based teaching materials for developing teaching materials for food and local wisdom of Banyuwangi batik have been implemented. In terms of developing teaching materials based on Ethnoscience of Batik (ETNOSTIK) from Laweyan, it has never existed.

The development of teaching materials based on Batik Ethnoscience (ETNOSTIK) in material changes in the form of objects has a research goal so that the development of learning teaching materials with science materials that combine material changes in the form of objects with the local wisdom of Laweyan batik is expected to instill values of love for local culture in students from an early age. Therefore, research was conducted to analyze the need to develop ETNOSTIC-based teaching materials in elementary schools.

METHODS

Type and Design

This research design is R & D (Research and Development). This research uses the 4D model, which has 4 stages, namely (1) Define, (2) Design, (3) Develop, and (4) Dissemination, adapted to 4-D measures based on Thiagarajan, Semmel, and Semmel (1974). However, this research is only limited to the defined stage, which is to discover the use of teaching materials in the field, discover knowledge about ethnoscience, and analyze the urgency of developing ETNOSTIC-based teaching materials.

Data and Data Sources

The data obtained from this reasearch are 6 4th grade teachers from 5 elementary schools, namely SDN 04 Lempong, SDN Telukan 02, SDN Gelaran 1, SD 06 Al Islam Al fajar Surakarta, SDIT Nurul Huda Pracimantoro by giving the questionnaires and interviews.

Data collection technique

The data collection techniques used in this research are questionnaires and interviews. The questionnaire aims to collect data by asking several questions about the use of teaching materials in the field, teachers' knowledge of ethnoscience, describing the experience of using ethnoscience-based teaching materials by teachers, analyzing the urgency of developing teaching materials based on batik ethnoscience (ETNOSTIK) in elementary schools to respondents to answer. Interviews are used to strengthen understanding of existing topics or problems, get more detailed ideas and more accurate information, and answer questions in the questionnaire.

Data analysis

The descriptive analysis technique is the data analysis technique used in this research. This technique begins with the stages of: a) evaluating the shortcomings of the use of teaching materials in the field, b) knowing the teacher's understanding of ethnoscience, c) describing the experience of using ethnoscience-based teaching materials by teachers, d) analyzing the urgency of developing ETNOSTIK-based teaching materials (Batik ethnoscience) in elementary schools.

Data validity was tested using source and triangulation techniques. Source triangulation aims to obtain data from different sources and then analyze it to produce relevant conclusions (Soegiyono, 2013). The triangulation technique is a data-checking technique that uses other sources or information from outside the data to check and compare the results of questionnaires and interviews.

RESULTS AND DISCUSSION

Based on the results of the needs analysis questionnaire and interviews with 6 grade 4 teachers from 5 elementary schools, namely SDN 04 Lempong, SDN Telukan 02, SDN Gelaran 1, SD 06 Al Islam Al fajar Surakarta, SDIT Nurul Huda Pracimantoro, it is known that teachers have been using teaching materials that are generally provided by schools and sources on the internet. This raises several teacher responses, namely, there are deficiencies or weaknesses in the teaching materials used so far. This is due to many factors, for example, the teaching materials used do not contain material related to ethnoscience. Teaching materials that are not ethnoscience-based can be due to the need for more knowledge and understanding related to ethnoscience among teaching material developers. It is essential to develop teaching materials that include an ethnoscience approach so that learning becomes more comprehensive and reflects students' cultural diversity and experiences.

The results of this study can be presented in several aspects, namely:

1. **Lack of Teaching Materials**

   According to the needs analysis questionnaire results, 66% stated that deficiencies were found in the teaching materials used during learning. Meanwhile, 34% of the data stated no deficiencies in the teaching materials. In Figure 1 below is the percentage of the presence or absence of deficiencies in the material aspect and the practicality of using the teaching materials applied:

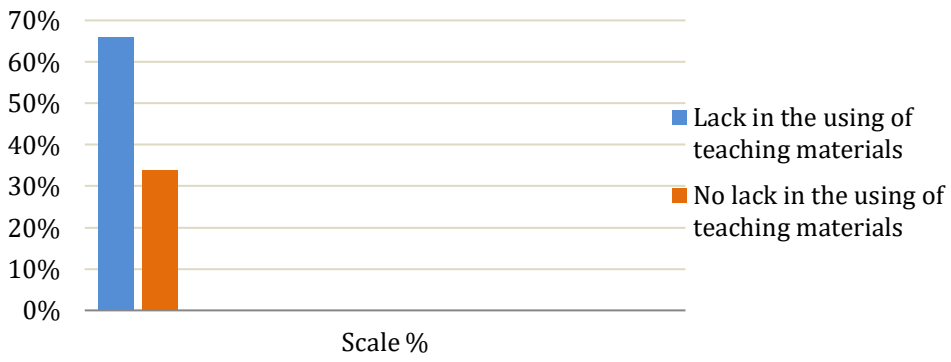

Figure 1. Percentage of shortcomings in the use of teaching materials

Based on figure 1, the percentage results of the needs analysis questionnaire,

which were strengthened by interviews with 6 teachers, it was concluded that there needed to be more on the material aspects and practicality of using the current teaching materials. The teaching materials cannot provide opportunities for student interaction or involvement. Students tend to get bored because the teacher applies the lecture method; most of the material comes from the teaching materials, and there are no updates. Furthermore, the teaching materials used need more media limitations, which must be improved to illustrate more complex concepts or dynamic illustrations. The existing material is only partially linked to real situations in the teaching materials used. Supposedly, the existence of a real context and relevant case studies can help students see or even practice the practical application of what students learn. This is in line with research conducted by (Amara et al., 2023) that students tend to be less enthusiastic during learning because, during the teaching and learning process, teachers only use teaching materials mostly filled with writing. In teaching materials that mostly contain writing, the illustrations are felt to be lacking, so students only read and understand concepts abstractly (Sulistri et al., 2020). Teaching materials are one of the supports for learning activities. Therefore, teaching materials should be further developed. The importance of student motivation and interest in learning, especially science, is expected to be fun with less boredom and show a higher level of engagement with learning so that students can maximize their abilities (Membiela et al., 2023). With increased ability students are expected to be able to more easily solve related problems and utilizee them in everyday life (Hadiyanti, 2021).

2. Teacher's Understanding of Ethnoscience

Based on the results of the needs analysis questionnaire on understanding ethnoscience, it was found that 83% did not know or did not understand ethnoscience. While as many as 17% know or understand about ethnoscience. Figure 2 presents the percentage of teachers' understanding of ethnoscience:

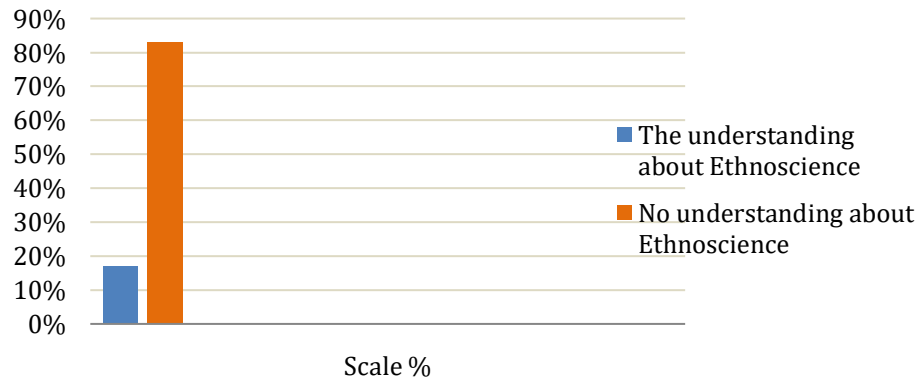

Figure 2. Percentage of ethnoscience understanding

Based on figure 2, in interviews on the aspect of teachers' understanding of ethnoscience, teachers consider the integration of ethnoscience into learning to use items that are around, which still needs to be included in the realm of ethnoscience-

based learning because it has yet to link local wisdom to science learning. Meanwhile, they need help understanding the word ethnoscience and are more familiar with the word local wisdom. The interviewed teachers tended to be senior teachers, so they needed to understand the existing terms. Meanwhile, teachers who tend to be young understand what ethnoscience means. This is in line with research conducted by (Hazizah & Rigianti, 2021) that several factors cause senior teachers to be less updated with existing developments. One of the factors is age, which influences the teacher's memory, which may begin to decline, making it difficult to learn or remember about developments in the world of education and lack of openness to innovative ideas. In terms of experience, senior teachers have more control. They already know how to make tape, tempeh, or something else that is a component of ethnoscience. However, from the term or name, they must understand that it is called ethnoscience. In addition, in integrating ethnoscience, teachers still need help applying it. Because of this, teachers prefer to separate learning about local wisdom from science. From this, efforts are needed to increase understanding and application of ethnoscience more vigorously among teachers.

3. Experience with Ethnoscience Teaching Materials

From the experience of using teaching materials, ethnoscience-based teaching materials have been widely applied by teachers. However, teachers need to realize that it is interpreted by ethnoscience. In Figure 3 below is the percentage of the experience of using ethnoscience-based teaching materials by teachers:

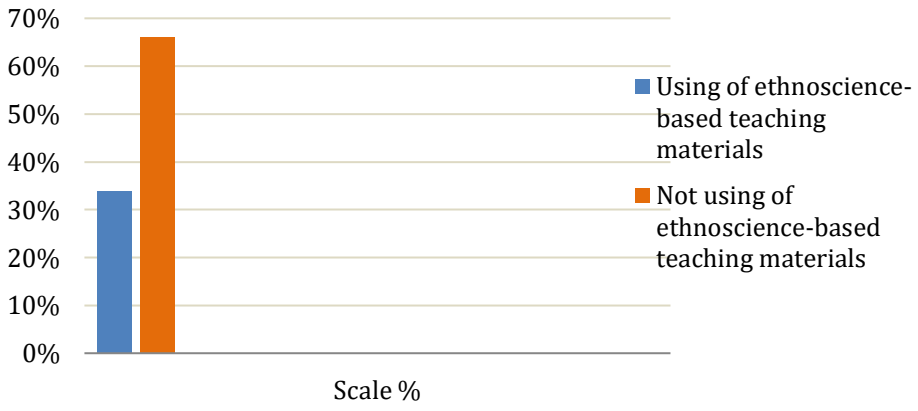

Figure 3. Percentage of the use of ethnoscience-based teaching materials

In the data contained in Figure 3, it is stated that 34% stated that teachers have

used ethnoscience-based teaching materials, and 66% of teachers have not or do not use ethnoscience-based teaching materials.

Based on the results of interviews, there are several influences in the experience of using ethnoscience-based teaching materials for students by several teachers who have implemented it. It was mentioned that students become more able to understand the material because the teaching materials are associated with realistic and more real circumstances found in everyday life. Ethnoscience-based teaching materials pay more attention to knowledge and practices about local cultures that exist in the community. Integrating local wisdom in teaching materials makes it easier for students to understand the material because they can relate the material learned to the students' own experiences. In addition, with ethnoscience-based teaching materials, students become more respectful and recognize the Indonesian culture around them. This is in line with research conducted by (Nelmi & Amini, 2023) that learning by applying ethnoscience-based teaching materials makes students more enthusiastic, excited, and active so that students better understand the material presented. Students can better remember knowledge based on what they practice themselves (Wang et al., 2023). Ethnoscience-based teaching materials introduce students closer to culture and the surrounding environment. This is a consideration for researchers to develop it. Research results from (Kriswati et al., 2020) recommend developing ethnoscience-based teaching materials.

4. The Urgency of Developing Teaching Materials for Batik Ethnoscience (ETNOSTICS)

From the needs analysis questionnaire data, the teachers agreed on the development of teaching materials based on Ethnoscience Batik (ETNOSTIK) in the material of changes in the form of objects in elementary school or in general it is highly recommended to develop ethnoscience-based learning resources as stated in the percentage in Figure 4 which shows data as much as 100% the need to make teaching materials based on ETNOSTIK (Batik Ethnoscience) in the material of changes in the form of objects in elementary school.

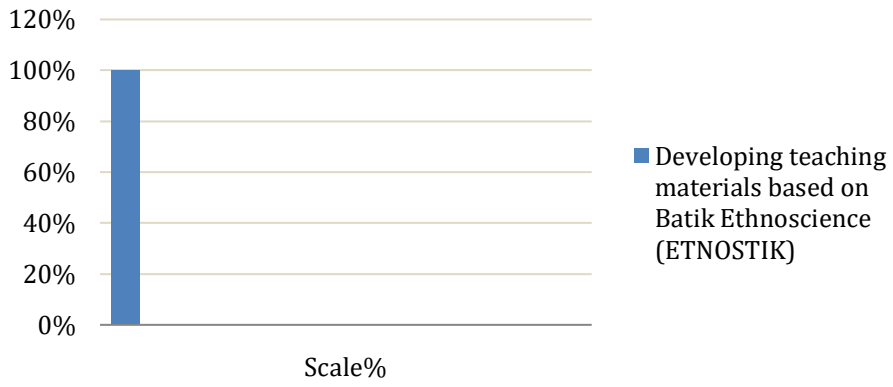

Figure 4. Percentage of teachers' statements about the need to develop teaching materials based on Batik Ethnoscience (ETNOSTIK)

One example of implementing ethnoscience-based teaching materials is the material of changes in the form of objects in grade 4 SD / MI by integrating batik culture in Indonesia, especially in Laweyan batik. The processes involved in batik involve

several changes in objects and the materials used. With this process, it can be observed how knowledge about changes in the form of objects can be applied in the practical context of making batik, especially Laweyan batik.

In interviews with teachers, they explained the need for the development of teaching materials, especially in the development of ethnoscience-based teaching materials, in the material of changes in the form of objects that are targeted by the author in the development of teaching materials based on Batik Ethnoscience or ETNOSTIK. The batik used in this development is Laweyan Batik, one of the icons of Solo. Making batik means studying the material changes in the form of objects. Ethnoscience-based teaching materials explain scientific concepts in the local context and daily experiences of students. This makes learning more relevant and easy for students to understand because they can see the application of these concepts directly in their real lives.

Developing teaching materials, especially those based on ethnoscience, is very necessary. The purpose of developing ethnoscience-based teaching materials is to update previously used teaching materials according to the needs of students by local wisdom. The renewal is expected to improve quality and make learning more efficient (Afriandi, 2020). In addition, by including local wisdom in learning, it is hoped that Indonesian cultural values will not be displaced by foreign cultures currently spreading in Indonesia. As stated (Muyassaroh & Sunaryati, 2021) teachers are encouraged to develop teaching materials with all the potential and various kinds of media available (Suprihatin & Manik, 2020) state that as educators, teachers should have the skills, expertise, and abilities that are a supporting process in molding the next generation of the nation.

CONCLUSION

Based on the descriptions above, it can be concluded that: a) the teaching materials used need to be improved because the majority only contain cognitive knowledge and practical aspects which results in students tending to get bored more quickly because the teaching materials used are limited in media and the majority are filled with writing, b) understanding teachers regarding ethnoscience material are not completely perfect. Understanding the word ethnoscience is better known by young teachers compared to senior teachers who are more familiar with the word local wisdom, c) the use of ethnoscience-based teaching materials implemented by several teachers has had a positive impact on students. Students can understand the material well by integrating local culture into teaching materials, d) in the urgency of developing ethnoscience-based teaching materials, teachers agreed to develop teaching materials on material changing the shape of objects made from batik. process as a combination of knowledge and local wisdom of Solo, namely laweyan batik which states the need to develop 100% material for changing the shape of objects based on Batik Ethnoscience (ETNOSTIK) for class 4 SD/Madrasah Ibtidaiyah students.

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