

Teaching Modules Based On Rote Weaving Ethnomathematics

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Abstract

The application of ethnomathematics in learning can make it easier for students to understand learning and create more meaningful learning for students. Therefore, this study aims to develop teaching modules based on Rote weaving ethnomathematics on quadrilateral material for class VII students of SMP Negeri 1 Southwest Rote that are valid, practical and effective. The method used in this research is the Research and Development (R&D) method and the research model used in the process of developing ethnomathematics-based teaching modules is the modified Four-D (4-D) development model and consists of 3 stages, namely Defining (Define), Designing (Design) and Developing (Development). Data collection techniques and instruments used were interviews, questionnaires, and tests. The data analysis techniques used are qualitative and quantitative data analysis techniques in the form of field studies, validity analysis techniques, practicality analysis techniques and effectiveness analysis techniques. The results of the study show that the developed teaching modules meet valid, practical and effective eligibility criteria. The average total validity by the material validator is 4.15 with the "valid" category. The total practicality average of the teachers is 5.0 in the "very practical" category. The average practicality of students in the small group trial was 4.16 in the "practical" category and in the large group trial was 4.36 in the "very practical" category. The percentage of completeness in the small group trial obtained 100% results in the "very effective" category, in the large group trial the results were 80% in the "effective" category, so that the teaching module based on Rote weaving ethnomathematics on quadrilateral material is feasible to use.

Keywords: Development, Teaching Modules, Ethnomathematics, Rote, Weaving, Quadrilaterals.

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I. Introduction

Education plays a very important role in developing and improving human resources. Education makes people advanced, tough, skilled and educated. The Indonesian government as the organizer of formal education is responsible for advancing education for the community because education is expected to produce the next generation of people who are responsible and creative. In accordance with the ideals that the Indonesian state wants to achieve as stated in Law No. 20 of 2003 concerning the National Education System Article 3. In achieving these educational goals, a teacher's role is very important, to design a fun learning process. and to achieve learning goals. Efforts that can be made by teachers, for example, are by linking education and culture.






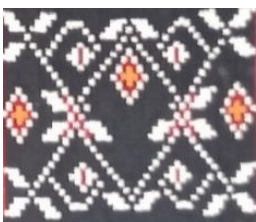

Permadi, et al (2021) stated that education is an effort to improve the quality of human personality and shape national integrity with cultural elements. One of the contents of the education provided at school is mathematics learning. In everyday life, people indirectly apply mathematics or mathematics is part of culture. One thing that can bridge the gap between culture and education is ethnomathematics. Ethnomathematics is a form of mathematics that is influenced or based on culture. Utami, et al (2018) stated that ethnomathematics is the various results of mathematical activities that are owned or developed in society, including mathematical concepts found in historical heritage and handicrafts in the form of temples and inscriptions, traditional pottery and equipment, local units, batik cloth motifs and embroidery, ikat weaving, traditional games and community settlement patterns. Culture-based mathematics can be applied in school learning, for example in geometry material

Geometry is a field in mathematics that studies points, lines, planes and space as well as their properties, measurements and relationships with each other. One of the subjects that emerged as a problem was the subject of quadrilaterals taught in class VII, even semester. Quadrilateral material has various shapes such as squares, rectangles, parallelograms, trapezoids, rhombuses and kites, so quadrilateral material is very suitable to be associated with cultural elements because quadrilateral material is very close to everyday life.

We can also find rectangular material in the culture of Rote Ndao Regency, where it is found in historic buildings such as Rote traditional houses. Rectangular shapes can also be found in palm woven forms and most often we can find them in typical Rote ikat weaving. The ikat weaving produced by the Rote community is in the form of blankets and sarongs. Blankets for men in the Ndao language are called *Sig'i* and sarongs for women in the Ndao language are called *Rabhi*. The names of woven motifs in Rote Ndao Regency are adapted to the names of small kingdoms in Rote Ndao. Each kingdom has its own characteristic motifs/flowers. This motif has been around since the royal era (*nusak*) and is inspired by the natural world around us which is closely related to everyday human life, which contains many elements of mathematical geometry such as squares, rectangles, rhombuses and so on.

In this research, researchers used original woven symbols and motifs originating from Ndao and Termanu which are still maintained and preserved today. The Ndao motifs used in this research are the *Ana Dhe'u* motif, the *Ana Langi* motif, the *Mada Karoko* motif, the *Ana Kapepe* motif, and the *Ai Buna* motif. Meanwhile, the Termanu motifs used in this research are the *Pendi* motif and the *Manu Eik* motif.

Table 1. Motifs and Mathematics Concepts

No	Motif	Form	Mathematics concept
1	 <p>Ana Kapepe</p>		Rhombus
2	 <p>Madaha Karorko</p>		Rectangular
3	 <p>Ai Buna</p>		Parallelogram
4			Square

But now, because of developments over time, weaving has become more modern and its cultural values are increasingly fading, the motifs continue to be modified and the colors are starting to become more widespread, not just black and white. Today's young people in Rote Ndao Regency no longer can Recognize the original motif

of woven Rote. So it is necessary to educate or introduce the original motifs of Rote Weaving to children through cultural implementation in the learning materials taught in schools so that the original motifs of Rote Weaving itself are not lost to the erodes of time. Utilizing local culture as a contextual learning resource is very important because of the cultural diversity that Indonesia has. One use of local culture as a contextual learning resource can be done by developing teaching materials in the form of modules based on Rote weaving.

Modules are learning tools in written or printed form that are arranged systematically, contain learning materials, methods, learning objectives based on basic competencies or indicators of competency achievement, instructions for self-introductory learning activities and provide opportunities for students to test themselves through practice questions, presented in the module, (Hamdani, 2011). With the Rote weaving-based module, it is able to increase students' motivation to learn which is designed in an interesting and contextual way so that learning becomes more fun and meaningful. In the designed learning module, the researcher displays pictures of original woven motifs that are related to rectangular material, so that when students see them, they will be interested in learning about them because they believe that they belong to the original Rote Ndao tradition so that there is a special pride for students in learning them.

This research was designed to be carried out at SMP Negeri 1 Southwest Rote. This is motivated by the close relationship between understanding Rote weaving and students' thinking patterns regarding the implementation of culture in low mathematics at this school. The results of initial observations and interviews conducted with teachers and students at SMP Negeri 1 Southwest Rote, researchers found that teachers still use conventional teaching materials, namely in the form of uninteresting and monotonous textbooks and students work sheet, teachers also use practical teaching materials obtained from the internet with invalid source. The use of these teaching materials has not been able to attract students' interest in learning mathematics and has not been able to encourage students' mathematical thinking abilities, as evidenced by the students' mathematics exam results, especially quadrilaterals, which are still low.

Researchers also conducted interviews with class VII students at SMP Negeri 1 Southwest Rote and found that almost all of the students in the class did not know enough when asked to name Rote weaving motifs, which are basically their native culture. Based on the results of these initial observations, it is necessary to develop teaching materials that are interesting and real in students' lives to help the students' learning process. The teaching material that can be developed is in the form of a mathematics learning module with rectangular material based on Rote weaving with the aim of increasing students' mathematical knowledge because the learning used is related to culture in students' daily lives and students are also expected to be able to know, appreciate, and participate in preserving the Rote weaving culture.

Based on the description above, researchers need to develop a valid, practical and effective learning module which is summarized in the research entitled "Development Teaching Module Based on Rote Weaving Ethnomathematics on Quadrilateral Material.

II. Research Methods

This research is of the Research and Development (R&D) type or better known as research and development. Research and Development (R&D) is research carried out to develop or produce a product and then test the effectiveness of the product.

The research method used in this research is a method developed by Sivasailam Thiagarajan, Dorothy S. Semmel and Melyn I. Semmel in Sugiono (2019), namely a modified 4-D model (Four-D Model) device development method, consisting of 4 stages of development and modified into 3 stages, namely the definition stage, the planning stage (design) and the development stage (develop). Devine (definition) is an activity to determine what product will be developed along with its specifications. This stage is a needs analysis activity carried out through research and literature study. Design includes activities to create a design for a specified product. Development includes the activity of making a design into a product and testing the validity of the product repeatedly until the product is produced in accordance with the specified specifications. Dissemination (distribution) includes the activity of disseminating products that have been tested for use by other people. However, in this research it only reached the third stage, whereas the Dissemination stage was not carried out due to time and cost limitations so the researcher only carried out development up to the Development stage.

Data analysis technique

The data collection instrument used in this development research aims to measure the achievement of the research product, namely the Teaching Module Based on Ethnomathematics of Rote Weaving on Quadrilateral Material, according to valid, practical and effective criteria. The instruments used are test and non-test instruments, in the form of: interview sheets, questionnaires, validation sheets carried out by expert lecturers and mathematics teachers and test sheets in the form of post-tests. Scoring the validity and practicality of the Teaching Module uses a 1-5 Likert scale then the average score is converted into qualitative data according to the existing score intervals and categorized. Practicality analysis is based on teacher and student response questionnaires.

Meanwhile, for the effectiveness of the Teaching Module, this assessment is based on the results of tests carried out by students.

Table 2 Practicality Categorization Criteria

Score Intervals	Category
$0 \leq \bar{x} < 1.8$	Not Good
$1.8 \leq \bar{x} < 2.6$	Not Enough
$2.6 \leq \bar{x} < 3.4$	Enough
$3.4 \leq \bar{x} < 4.2$	Good
$4.2 \leq \bar{x} \leq 5$	Very Good

III. Results And Discussion

The results obtained from this research are in the form of a teaching module called the Mathematical Module for Quadrilateral Material Based on Rote Weaving for class VII students of SMP Negeri 1 Southwest Rote. The resulting teaching module is a printed teaching module that can be used and studied directly by students independently without teacher guidance. Research and development results are produced through the stages contained in the 4-D development model (Define, Design, Development and Disseminate). The results of these stages are:

Define

At this stage, initial data will be obtained in the form of preliminary final analysis, student analysis, material analysis, task analysis and specification of learning objectives. To obtain this data, researchers conducted interviews and direct observations on teachers and students of class VII SMP Negeri 1 Southwest Rote. The results of the analysis obtained are that learning in class VII SMP Negeri 1 Southwest Rote is carried out based on the 2013 Curriculum and the learning resources used in the learning process are in the form of Class VII Semester 2 Mathematics books issued by the Ministry of Education and Culture of the Republic of Indonesia. It is also known that the class VII mathematics teacher has never developed teaching modules or other teaching materials.

Apart from that, based on classroom observations, teachers also tend to apply the lecture method so that learning takes place in one direction and tends to be rigid. These factors have the final impact, namely that learning mathematics, especially quadrilateral material, is very difficult to understand and very boring so that students are lazy about studying so that students' understanding of quadrilateral material has not been achieved optimally. Researchers have also carried out an analysis of mathematical concepts and the form of Rote weaving motifs, which results in obtaining that all rectangular shapes are contained in Rote weaving. In the motifs *Manu Eik*, *Madha Karoko*, *Ai Buna*, *Ana Kapepe*, *Ana Dheu*, *Ana Langi* and *Pendi* emphasize the concept of a quadrilateral, namely in the form of a square, rectangle, rhombus, parallelogram, kite and trapezoid. This concept of quadrilaterals is found in the main/sub-subject of KD Quadrilateral Building. 3. 11 and KD 4. 11 Class VII even semester.

The main tasks that must be achieved by students in this material are knowing the meaning of a quadrilateral, the properties of a quadrilateral, finding the formula for the perimeter and area of a quadrilateral, relating the formulas for the perimeter and area of a quadrilateral, solving daily life problems using the properties of a quadrilateral and solving problems. Everyday life uses the concept of perimeter and area of a quadrilateral.

Design (Designing)

At this stage there are several activity steps carried out, namely the stage of selecting teaching materials, selecting the format, and initial product design. The selection of teaching materials was based on the results of the initial final analysis, student analysis, task analysis, concept analysis, and specification of learning objectives. Based on these results, it was concluded that the teaching materials needed in the learning process of quadrilateral material were in the form of a quadrilateral teaching module based on the ethnomathematics of Rote weaving. This product development aims to make it easier for students to learn mathematics, especially quadrilaterals.

The choice of format uses learning formats that are in accordance with the 2013 Curriculum (K-13) issued by the Ministry of National Education and also uses formats for arranging teaching modules. However, the content of the teaching material is adjusted to the results of material analysis, task analysis and specification of learning achievement indicators. Learning module development format using Microsoft 2016 and Canva. Teaching modules are designed to be as attractive as possible so that they are able to attract students' interest in learning.

Initial design, at this stage the researcher designs the content and appearance of the module in accordance with the previous initial design, namely designing the module as attractive as possible so that students are interested in reading it and easy for students to accept. The learning module designed by researchers contains concepts, principles and facts on rectangular material related to Rote weaving. The initial step in writing the

content of the material in the module is to first read references from books related to quadrilateral material, then plan the presentation of the material that will be made in accordance with the formulation of basic competencies and indicators for quadrilateral material. The questions in the module are not entirely sourced from books, but there are several questions created by researchers and then modified, with example questions and exercises created accompanied by alternative solutions. The initial module design produced at this stage is called DRAFT A. The resulting Draft A will later be validated by validators at the development stage before being tested on students.

Development

After the design stage is complete, it will continue with the development stage. The aim of this stage is to produce a final draft of the teaching module that is valid, practical and effective. Activities in this stage include expert validation, small group trials and large group trials.

Expert Validation

Validation is carried out to determine whether the teaching module is appropriate or not. Validation is carried out to find out what is still lacking and needs to be added to the teaching module before it is tested further on students. Validation was carried out by 3 validators consisting of 2 lecturers and 1 mathematics teacher, the validator validated the teaching module developed (DRAFT A). The average total validity result obtained from the validators is 4.15 and is in the "valid" category. Based on the results of the validation calculations carried out by the three validators, the mathematics teaching module on quadrilateral material based on Rote weaving ethnomathematics for students at SMP Negeri 1 Southwest Rote is suitable for use.

Small Group Trial

Small group trials were carried out on 6 class VII students at SMP Negeri 1 Southwest Rote who were not research subjects. Small group trials are carried out to reduce errors that may arise in large group trials or in research subjects. In small group trials, researchers analyze the results of tests and student response questionnaires to measure the effectiveness and practicality of teaching materials and see whether revisions need to be made or not. The results of the practicality analysis of small group trials obtained an average practicality of 4.16 and were in the "practical" category and the results of student learning effectiveness obtained were that the percentage of student learning completeness using Rote weaving-based mathematics teaching modules on rectangular material was 100% which was greater than the specified KKM. by school, namely ≥ 65 . These results are then converted to obtain the "very effective" criteria.

Based on the results of the practicality and validity analysis in small group trials, the teaching mode used was changed so that DRAFT B was declared valid. The results of the DRAFT B analysis which have been declared valid are called DRAFT C which will be used in large group trials.

Large Group Trial

The large group trial was carried out by the class VII mathematics teacher in class VIIC of SMP Negeri 1 Southwest Rote consisting of 25 people. The practicality of the teaching module is obtained from teacher and student assessments through the completed teaching module response questionnaire. The results of the practicality of the teaching modules by teachers obtained an average practicality of 5 and were in the "very practical" category, while the average results of the practicality of teaching modules by students were 4.36 and were in the "very practical" category. The results of the effectiveness of the teaching module were obtained through the percentage of students' learning completeness after learning using the teaching module in large group trials, namely 80% and in the "effective" category.

The results of the practicality and validity analysis in the large group trial showed that the teaching mode used did not change so that DRAFT C was declared valid. The results of the DRAFT C analysis which have been declared valid, practical and effective are called FINAL DRAFT which is the final result of this research.

IV. Conclusion

Based on the results of research on the development of teaching modules based on Rote weaving ethnomathematics on quadrilateral material for class VII students of SMP Negeri 1 Southwest Rote which was obtained through the development stage with a 4-D model which was modified into 3 stages, namely: Define, Design and Dissemination, research data was obtained for the categories valid with an average validity of 4.15. For the practical category, the practicality of the teaching module by the teacher was 5, the practicality of the small group was 4.16 and the practicality of the large group teaching module was 4.36. Meanwhile, for the effectiveness category, the average completeness of learning outcomes for small group students was 100% and the average completeness of learning outcomes for large group students was 80%. Based on this data, the teaching module developed meets the criteria of being valid, practical and effective, so it can be said that the Teaching

Module Based on Rote Weaving Ethnomathematics on Quadrilateral Material is good and suitable for use in the learning process.

References

- [1]. Abiyasa, P. K. (2018). Analisis Pemahaman Konsep Matematis Siswa Kelas Viii Smp Pada Materi Spldv Dengan Ilustrasi Jual Beli Pakaian Adat. Prosding Seminar Nasional Etnomatematika. Fakultas Keguruan Dan Ilmu Pendidikan, Universitas Sanata Dharma: Yogyakarta.
- [2]. Anwar, Ilham. (2010). Pengembangan Bahan Ajar. Bahan Kuliah Online. Direktori Upi. Bandung.
- [3]. Arikunto & Suharsimi. (2006). Prosedur Penelitian: Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.
- [4]. Ayni, M. N., (2022). Pengembangan E-Modul Bercirikan Etnomatematika Pada Materi Bangun Ruang Sisi Datar. Skripsi. Tidak Diterbitkan. Fakultas Tarbiyah Dan Keguruan. Universitas Islam Negeri Sultan Syarif Kasim: Riau
- [5]. Daryanto, & Dwicahyono, A. (2014). Pengembangan Perangkat Pembelajaran. Jogjakarta: Gava Media
- [6]. Day, Y. (2022). Studi Tentang Makna Simbolik Motif Tenun Ikat Sig'i (Selimut) Dan Rabhi (Sarung) Di Desa Ndaonuse Kabupaten Rote Ndao. Skripsi. Tidak Diterbitkan. Fakultas Keguruan Dan Ilmu Pendidikan. Universitas Nusa Cendana: Kupang
- [7]. Departemen Pendidikan Nasional. (2008). Panduan Pengembangan Bahan Ajar. Jakarta: Direktorat Jenderal Management Pendidikan Dasar Dan Menengah.
- [8]. Dominikus, W.S. (2018). Etnomatematika Adonara. Malang: Media Nusa Creative.
- [9]. Emmanuela, F. (2020). Pengembangan Modul Pembelajaran Matematika Berbasis Hots Pada Topik Segiempat. Skripsi. Tida Diterbitkan. Fakultas Keguruan Dan Ilmu Pendidikan. Universitas Sanata Darma: Yogyakarta.
- [10]. Hamdani. (2011). Strategi Belajar Mengajar. Bandung: Pustaka Setia
- [11]. Killa, M. M. (2021). Eksplorasi Etnomatematika Budaya Menenun Di Pulau Rote Dan Integrasinya Dalam Pembelajaran Matematika. Skripsi. Tidak Diterbitkan. Fakultas Keguruan Dan Ilmu Pendidikan. Universitas Nusa Cendana: Kupang
- [12]. Kompri. (2016). Manajemen Pendidikan Komponen Elementer Kemajuan Sekolah. Yogyakarta: Ar-Ruzz.
- [13]. Lestari, S. (2019). Pengembangan Modul Pembelajaran Berbasis Etnomatematika Dalam Tradisi Luwu. Skripsi. Tidak Diterbitkan. Fakultas Tarbiyah Dan Ilmu Keguruan. Institut Agama Islam Negeri: Palopo.
- [14]. Maryati & Wira, P. (2019). Etnomatematika: Eksplorasi Dalam Tarian Tradisional Pada Pembukaan Asian Games. Jurnal Pendidikan Matematika Dan Matematika, 5(1), 24.
- [15]. Majid, A. (2013). Perencanaan Pembelajaran . Bandung: Pt. Remaja Rosda Karya.
- [16]. Mudlofir, A. (2011). Aplikasi Pengembangan Kurikulum Tingkat Satuan Pendidikan (Ktsp) Dan Bahan Ajar Dalam Pendidikan Agama Islam. Jakarta: Raja Wali Press.
- [17]. Mulyasa. (2009). Kurikulum Yang Disempurnakan Pengembangan Standar Kompetensi Dan Kompetensi Dasar. Bandung: Pt. Remaja Rosda Karya .
- [18]. Permadi, Y. A., & Dkk. (2021). Pengantar Pendidikan. Medan: Yayasan Kita Menulis.
- [19]. Prastowo, A. (2012). Panduan Kreatif Membuat Bahan Ajar Inovatif. Jogjakarta: Diva Press
- [20]. Prastowo, A. (2014). Pembelajaran Bahan Ajar Tematik Tinjauan Teoritis Dan Praktis. Jakarta: Kencana Prenamedia Group.
- [21]. Prastowo, A. (2014). Pengembangan Bahan Ajar Tematik. Jakarta: Kencana.
- [22]. Purwanto, & Dkk. (2007). Pengembangan Modul . Jakarta: Departemen Pendidikan Nasional.
- [23]. Ramadhani, & Dkk. (2020). Metode Dan Teknik Pembelajaran Inovatif . Tampa Tempat: Yayasan Kita Menulis.
- [24]. Sabri, A. (2010). Strategi Belajar Mengajar & Micro Teaching. Tampa Tempat: Ciputat Press.
- [25]. Salmawati. (2021). Pengembangan Modul Pembelajaran Matematika Materi Segiempat Berbasis Etnomatematika (Kerawang Gayo Lues) Siswa Smp. Skripsi. Tidak Dipublis. Fakultas Tarbiyah Dan Keguruan. Universitas Islam Negeri Ar-Raniry Darussalam: Banda Aceh.
- [26]. Sekarndary, H. (2022). Kajian Etnomatematika Pada Pembuatan Tenun Ikat Kabupaten Sintang. Jurnal Pendidikan Matematika Fkip Universitas Tanjungpura Pontianak, 11(6), 519-528.
- [27]. Septora, R. (2017). Pengembangan Modul Dengan Menggunakan Pendekatan Sainifik Pada Kelas X Sekolah Menengah Atas. Jurnal Lentera Pendidikan Pusat Penelitian Lppm Um Metro, 2(1), 87-97.
- [28]. Suastika, I. K. & Amaylya R. (2019). Pengembangan Modul Pembelajaran Matematika Dengan Pendekatan Kontekstual. Jurnal Pendidikan Matematika Indonesia, 4(2), 59.
- [29]. Sudjono, A. (2010). Pengantar Statistika Pendidikan. Jakarta: Pt Raja Grafindo Persada.
- [30]. Thiagarajan, S. Semmel, Ds. Semmel, M. (1974). Instructional Development For Training Teachers Of Exceptional Children. A Sourse Book. Bloomington: Central For Innovation On Teaching The Handicapped.
- [31]. Sugiyono. (2015). Metode Penelitian Pendidikan Kuantitatif, Kualitatif Dan R&D. Bandung: Alfabeta
- [32]. Utami, R. E., & Dkk. (2018). Pengembangan E-Modul Berbasis Etnomatematika Untuk Meningkatkan Kemampuan Pemecahan Masalah. Jnpm (Jurnal Nasional Pendidikan Matematika), 2(2), 268.
- [33]. Yuliana, R. (2017). Pengembangan Perangkat Pembelajaran Dengan Pendekatan Pmri Pada Materi Bangun Ruang Sisi Lengkung Untuk Smp Kelas Ix. Jurnal Pendidikan Matematika, 6(1), 60-67.