

## AN ETHNOMATICS-BASED LEARNING INNOVATION: A LITERATURE REVIEW

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### Abstract

Mathematics learning that is used in the process of teaching and learning activities at school needs a novelty, namely utilizing local culture where students can connect with mathematics in everyday life so that they can instill a love of local culture and form character in students. 1) knowing ethnomathematics learning innovation; 2) To transform local cultural values as one of the means of building national character. The design that is used in this article is a literature review. Articles are collected through reference sources such as Springer Link, JSTOR, and Google Scholar. The criteria of articles that are used in the last six years, starting from 2014-2019 which produced a collection of 9 scientific articles. The analysis was carried out by collecting articles and reducing them according to the theme of the article. The first results show learning innovation with a local cultural approach so that students will easily implement mathematics with the local culture. The second is to instill local cultural values in learning. It will instill the character of love for the country and the nation.

**Keywords:** character, culture, ethnomathematics , Innovation, learning

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*Received: 27 Jul 2020 – Revised: 4 Sep 2020 – Accepted 22Nov 2020 – Available online 30 Dec 2020*

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### I. INTRODUCTION

Innovation is a social system, in an innovation system that is learning, and learning is a social activity that involves people interacting, characterized by positive feedback from one another in the learning and innovation process. (Lundvall 2016). Culture and education are two things that support each other, thus all efforts to preserve local culture mean efforts to advance education (Wahyu et al. 2017). In daily life activities, consciously or not, everyone has applied mathematics to daily culture such as counting, measuring, grouping activities, so that in the process of learning mathematics at school there is a need for a link between the mathematics theory taught in

school and mathematics science in daily life at the community.

The results of the 2018 PISA and TIMSS studies, in the fields of mathematics and science, are ranked below the average. In the field of mathematics, Indonesia is in reached 379 with an OECD average score of 487, while in the field of science it is in reached 389 with an OECD average score of 489. It happens because students are less capable of solving mathematical problems; reasoning and problem-solving. It is because in learning mathematics that is used is not contextual (Umy Zahroh 2018)

Based on the gaps above, it is hoped that changes can be made to improve the ability of students to understand mathematics which can be applied in daily life. With the local wisdom, students' stay is expected can instill the character of love for local culture and the nation so that the author examines ethnomathematics based learning innovations.

Ethnomathematics is a discipline that becomes a widespread concern in the learning process of mathematics. It is because learning in schools has a formal impression that is less contextual with the mathematics found in children in daily life which are very different (Umy Zahroh 2018). With ethnomathematics-based learning, students can implement the theory and mathematics science obtained from life in society.

The application of ethnomathematics can be used as an approach to learning mathematics and served as an intermediary for developing the nation's character in education. Ethnomathematics can collaborate with elements of the local culture so that it will influence the cultural mindset that exists in society. In learning mathematics to develop national character, of course, it must be supported by educators. The role of educators is very influential because educators as one of the implementers in the teaching and learning process in the classroom. They interact directly and are responsible for character education that is instilled from an early age and can have a direct or indirect impact in character building so that noble characters and cultural values are integrated into national character (Wahyuni, Ayu Aji Wedaring Tias, Tias, and Sani 2013)

Learning innovation is a whole of teaching and learning processes that can present something new in the learning process so that it can eliminate boredom with innovative learning. An educator can present something new starting from the aspects of teaching strategies, teaching materials, and methods used in teaching (RJ Nugroho 2019).

In innovative learning, an educator can apply new learners according to the environment of the students are in so that learning at school can

be applied to the daily life of students. With learning based on moral values in society and cultural values in society, it is hoped that it can foster a love for the homeland, the nation, and the state. According to (Kim and Taylor 2017; Yao and Enright 2018), good morals are necessary for the students. The state needs candidates who have good morals

In previous research, the Ethnomathematics of Javanese Culture: Innovation in Mathematics Learning in Elementary Schools has shown that the application of ethnomathematics in learning will be more meaningful for students if learning mathematics from a cultural point of view. (Hendra Erik Rudyanto, Apri Kartikasari HS 2017). Research on the Cultivation of Character Education through Ethnomatematic . Mathematical concepts are studied in cultural practice by incorporating local cultural wisdom, students can understand mathematical concepts contextually and more understand the culture around students related to mathematics while for teachers to instill values - the noble value of national culture so that it has an impact on the character education of the nation (GN Nugroho 2018). The novelty that can be developed from previous research on ethnomathematics learning innovations and building national character

The questions in this literature review article are:

(LRQ1) knows ethnomathematics learning innovations

(LRQ2) To transform local cultural values as a means of building national character

In this review, the author will present the methods from the literature and studies that the author used. In the literature results section, the author will try to answer two research questions based on the articles that the author selects from JSTOR, Springer Link, and Google Scholar.

## II. METHOD

The review strategy used in this article is a systematic literature review. The type of review used in this research is a mapping review (Husnurofik Zidni, Nurmahampang Fitri 2019). It is also explained that the systematic review process allows researchers to take advantage of a transparent review procedure to search, evaluate, analyze and synthesize relevant research results far in advance to ensure that the training can be repeated and replicated. The author applied this approach mainly to perspectives and ideologies in a sustainable learning innovation model by applying the wisdom of where learners live and a shared framework (if any) that can be used for educators.

### A. Article Source

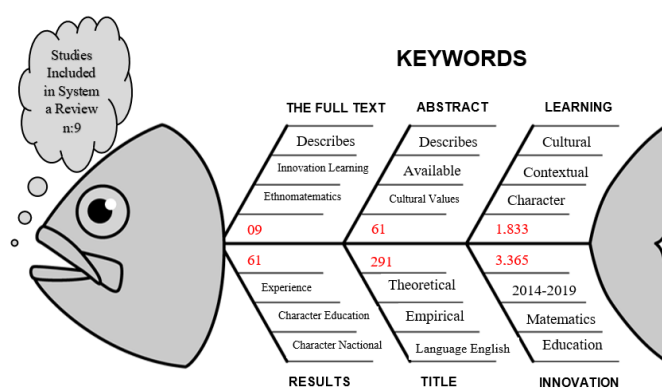
The author realizes that learning innovation with ethnomathematics is a very broad field of the study in various aspects and the author wants to make sure that in the study of data sources referring to the two questions in this review. The author decided to use the JSTOR, Springer Link, and Google Scholar databases. The reason the author used this database is that in the search for learning innovations from certain fields, namely ethnomathematics. The author uses this database in searching is very helpful in systematically reviewing learning innovations in ethnomathematics, so that the authors continue to look for articles that use this database.

In the initial search, the author used the keyword "Learning Innovation" and found thousands of articles from various databases. Therefore, the authors narrowed the theme by using keywords such as "learning innovation with ethnomathematics", " education", " innovation", "learning", "contextual", " character ", " cultural ", "research". This research is "Ethnomatematic Based Learning Innovation"

### B. Article Selection and Screening

Using searches on all three databases (JSTOR, Springer Link, and Google Scholar). The author then filtered from the

search results for articles that are not relevant to one of the two questions. And also filtered the article on ethnomathematics based Learning Innovation which is not relevant to this literature review because it explores other issues. The author analyzed the article title, keywords, and abstract to maintain 9 articles to be studied and synthesized completely. These articles are limited to 2014-2019. The differences in the search phrases from this literature review are presented with the Figure below



**Figure 1.** Fishbone Diagram in

Although there are only some articles that can be used, these articles can focus on the discussion of Learning Innovation with ethnomathematics. Some inappropriate articles discuss innovation in companies. After carrying out the screening process, there are only 9 research articles included in this question review. (see Table 1).

Data were collected using data extraction, including sample size, research design, and research methods used.

The compilation of data refers to the two research questions presented in the background. Based on the theoretical background and surveyed literature discuss, the authors then assess the processes of learning innovation to support or hinder the ethnomathematics learning process by applying the local culture and identifying values local cultural values to build national character. In the fishbone diagram in Figure 1, the author presents 9 articles selected for this study. This study includes ethnomathematics learning innovation with local culture to build national character.

### III. RESULTS AND DISCUSSION

#### RESULTS

##### **(LRQ1) knows ethnomathematics learning innovations**

An innovation that is carried out in the organization together during the implementation process will spread throughout the organization, the innovation will run continuously, in learning innovation the learning process does not only occur in the classroom but students learn values in daily life. (Hadlock and McDonald 2014). The importance of continuous innovation in the field of education at cultural centers and rural communities, so that it will have an impact on the collaboration between culture and education (SARGENT 2015).

Informal learning will be more productive, can help improve team performance, reduce uncertainty and misunderstanding (Phornprapha 2015). In mathematics learning, it is necessary to collaborate between formal and informal learning, namely by introducing students to the culture that exists in the school environment. Students in completing mathematics assignments are directed to connect personal experiences and local culture with mathematics, such things must be made clear educational goals by the teacher. (Jean-Baptiste Lagrange 2014)

According to (Ambrosio and Rosa 2017), An ethnomathematical perspective in the mathematics curriculum helps all participants to come to understand and appreciate alternative viewpoints, cultural diversity, natural language, mathematics, and visual representations which form a unique system for meaning-making. In this context, reorienting teaching and learning to include ethnomathematics can engage and excite students about learning and encourages them to see themselves as being able to do mathematics by validating their own cultural experiences, which serves as an essential component of understanding and celebrating the differences between diverse cultural groups.

Ethnomathematics in the process of learning Mathematics is seen as an approach to motivate learners to learn mathematics by connecting matter of mathematics that is taught by the local culture or can be practiced directly to reinforce the learning of Mathematic interest and strengthen character education (Luisa et al. 2018).

##### **(LRQ2) To transform local cultural values as one of the means to build the nation's character**

A transformative approach that is done by students' attractive experiences will have the potential to change identity and practice. The contextual teaching values of the students' life in teaching are very important because they feel those values are relevant to their lives.

In the application of local cultural values, Indonesia is rich in culture that can be used to bridge the delivery of mathematical material contextually with the culture of students living as revealed in research (Hendra Erik Rudyanto, Apri Kartikasari HS 2017). By using existing cultural products, it can be in the form of artifacts, traditional food, traditional games, batik motifs. By applying ethnomathematics, learning mathematics will be more meaningful for students and the culture is maintained. According to (Madusise 2015), the use of culturally-based activities can make mathematics more interesting to learn and to teach, so that students learn mathematics with culture and they can preserve the existing local culture.

According to (Dwidayati, and Suyitno 2019), the ethnomathematics approach can encourage the growth of students' nationalism. Its role, as a stimulus of the growth of nationalism in students, heightens the absorption of the students in learning mathematics and encourages the students to preserve the nation's cultural products.

#### DISCUSSION

Learning innovations carried out by teachers are more focused on students, it makes teachers teach more contextually in real-life situations (Hadlock and McDonald 2014). In this way,

students will understand more deeply about the application of mathematics learning material in their lives. This is relevant to research (Hendra Erik Rudyanto, Apri Kartikasari HS 2017), namely that learning must be able to provide the widest possible space for students to build knowledge and experience ranging from basic skills to high levels so that student creativity can develop.

Cultivating character on students is very needed for the nation and state, to encourage moral values towards students (Yao and Enright 2018). So, it is needed for learning innovations that implement local cultural values in the learning process. The Learners will be able to preserve preserving local cultures to form a national character sustainably as well as based learning ethnomathematics

#### IV. CONCLUSION

So, in the study based on this literature review, it can be concluded that learning innovation is needed to improve mathematics learning based on local culture. So, students can love the culture in which they live so that they will be able to preserve Indonesian cultures and form the character of the nation. The purpose of this literature review is to provide an overview of empirical studies on ethnomathematics based learning innovations. This study focuses on identifying local cultural values as one of the developments of the national character. There are 9 articles presented in this study. They describe various practices that have been carried out on ethnomathematics.

#### IV. ACKNOWLEDGMENTS

Our gratitude sends to Mr. Dr. Suyatno M.Pd.I, the head of the Ahmad Dahlan University, Master of Education Management study program. This article was presented at the International Conference on Education, leadership, and innovation on December 15, 2019, which was held by the Ahmad Dahlan University Master of Education Management

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