UNIVERSITI TEKNOLOGI MARA

AN ETHNOMATHEMATICAL CASE STUDY ON THE MATHEMATICAL CONCEPTS, MATHEMATICAL PRACTICES AND BELIEFS OF THE MALAY SONGKET WEAVERS

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Thesis submitted in fulfillment
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ABSTRACT

Songket is generally valued for its beautiful designs and patterns and not for the originality of ideas, which flows from the creative minds and the skilful hands of the gifted *songket* weavers. This is a qualitative research on ethnomathematics to investigate the mathematical concepts, mathematical practices and beliefs of the Malay *songket* weavers. In particular, the mathematics used in the *songket* weaving process, the motifs and patterns design process and the mathematical concepts found in a few selected *songket* patterns. Purposive sampling is used to select the subjects of this research. The *songket* weavers being the subjects for this study fall under two categories; six older generation traditional weavers and three younger generation contemporary weavers. Three mathematics lecturers from Universiti Teknologi MARA were chosen to be the respondents in identifying perceptions on the mathematical concepts that exist in the weaving process and the *songket* patterns. Questionnaires, observations, semi-structured and unstructured interviews were used to gather the data. The observations and interviews were videotaped and data was analysed using the framework of Universal Integrated Approach. This study has shown that *songket* weaving not only requires special skill and creativity, but mathematical knowledge and mathematical thinking is also embedded in the creative and artistic minds of the Malay *songket* weavers. Their work involves a lot of mathematical concepts, mathematical practices and values. The mathematics lecturers who were interviewed had acknowledged the existence of mathematical concepts and mathematical practices in the work of the weavers, and they also managed to identify some mathematics concepts and values embedded in a few selected *songket* patterns. It seems that the work of the weavers involves the mathematical practices of designing, visualizing, calculating, measuring, transforming, planning, organizing, executing, checking, correcting, repeating, drilling and adjusting. The application of mathematics concepts and values identified in the *songket* patterns are from the basic algebra of addition, subtraction, multiplication and division, measurement, size and scaling, approximation and precision, ratio and proportion, sequence, combination, equity and balance, geometrical shapes and geometrical concepts such as symmetry, transverse symmetry and mid-point, and the transformation concepts such as reflections and reflection axes, rotations and rotation points, dilation and repetitions. This study managed to replicate the existing songket pattern by applying the mathematics transformations concepts identified in the pattern using GeoGebra. The *songket* patterns could even be categorized under the symmetry groups standardized by the Union of Crystallography namely the Frieze Pattern and the Wallpaper Pattern. Mathematics transformations concepts could be used to generate new *songket* patterns, patterns with better symmetry, precise and accurate thread counts and examples of new songket patterns produced using those concepts using GeoGebra are also shown. The study also has revealed that the personality, action and work of the weavers portray their Islamic values and beliefs. They are humble, sincere, honest, conscientious, accountable, disciplined, organized, patient and hard working.

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