CRAFT MAKING FOR MATHEMATICAL LEARNING

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The study reports the findings from an observation I made in a Ghanaian woodwork shop where a woodworker constructs circles out of square plywood with only tape measure, hand saw and a pen to make circular tables. The findings call for more geometric activities centered on craft making since the conceptual grounding of circularity and other geometric properties becomes reconstructed in such craft making.

The study of mathematics by appreciating cultural activities and its contexts has evolved into what is now called ethno mathematics. In this study I define ethnomathematics as using cultural/indigenous/craft making as a tool to help reconstruct or 'unfreeze' the mathematical thinking that is 'hidden' or 'frozen' in old techniques, like, e.g., that of basket making (see Nti-Asante, 2020). Cultural/indigenous/craft making may refer to a more general type of practice, enacted on basic or advanced materials, either with no or high technology within a specific cultural context which may evidence the doing of STEM (see Nti-Asante, 2020). This comprises activities, materials, practices, and themes that are attuned to a more specific group, culture, or region (such as basket making, pottery, electronics upcycling, woodworking, or costume making) (Blikstein, 2020). This study presents findings from an observation made in a Ghanaian wood workshop on how a wood worker make circles out of rectangular plywoods to design circular tables. A guiding question was how do the woodworker make circles out of the rectangular plywood's using just handsaw, tape measure and a pen. I observed and participated in a one-day making of such circular tables from rectangular plywood's in the shop to identify the geometrical concepts which are evidenced and variedly reconstructed as the woodworker make the circular tables.

Findings: The   woodworker started by measuring 34cm by 34cm from the rectangular plywood using the tape measure. He cuts out the 34cm by 34cm figure. He said the cut-out shape of the plywood is a square because it is four sided and all the sides are 34cm. He said he is constructing a circle but he needs to make the square first. He said the square is to help him mark equal points from the middle to the diagonals he will be drawing later. He uses the blunt side of his hand saw to draw the diagonals of the square. He said he drew the diagonals to get the middle of the square. He added that he will also measure some distance off the diagonals later. He then divided the lengths of the square into two by using the tape measure to get 17cm each. He said he wants to join a line from the middle of the square to meet the middles of its lengths. He joins the lines from the middle of the square to meet the middle of its lengths using the blunt sides of his hand saw. He measured distances from the middle of the square to the middle of its lengths and said it is 16.8cm. He subtracted and marked 7.2cm from both ends of all diagonals of the square. He stated that he is doing that to make all distances from the edges of the square to its middle equal, thus as 16.8cm. He then bends the hand saw to lie on the marked

points on the diagonals for another worker to draw an arc. He repeated this last step to get the circle in the square. He measured all distances from the middle of the then square to the edges of the now circle to see if they are all 16.8cm. He states that since they are equal, thus 16.8cm the new shape is a circle. Hence, he has to cut off the left-over parts that were formerly square to make the circle visible. See attached image and video for reference. The findings show how circles and its properties are variedly reconstructed by a maker without using conventional mathematical software or tools. Hence, the need for geometric activities centered on craft making.