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Learners' Unique Responses: Can they be used to Promote Learning?

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Abstract
The use of learners' responses in teaching is important because it promotes active learning. It also enables the teacher to know the learners' thinking and reasoning. However, sometimes teachers do not know how to handle learners' unique responses, especially those they do not expect. The purpose of this article is to share information that can help teachers engage learners in meaningful learning by use of their unique responses as opposed to ignoring them. Using a reflection based on a lesson on the area of a trapezium, we discuss how a learner's unique response on the area of a parallelogram could be used to promote learning. In addition, we discuss how this idea could be extended to find the area of a trapezium. The article concludes with a call to teachers to draw on learners' unique responses and use them to promote learning.

Keywords
Active learning, Alternative ways of thinking, Deeper understanding, Unique responses

Introduction
In a classroom situation, teachers ask learners questions and expect certain responses. However, learners do not always give the expected responses. Rather, they give unique ones that could be correct or wrong. These responses are sometimes ignored because they are perceived to be wrong. Likely, teachers sometimes ignore learners' unique responses because they do not know how to adopt such unexpected responses in the current lesson. Unique responses given by learners are their ideas that can be used to promote active learning. The use of learners' ideas also ensures that they are engaged meaningfully in learning thus promoting inquiry as opposed to giving learners formulae and procedures to follow while solving problems. Through this article, we reflect on how a lesson on the area of a trapezium observed by the first author progressed and show missed opportunities for helping the students to learn meaningfully. We also discuss how learners' unique responses can be extended to help them develop a deeper understanding of the concept of the area of a trapezium.

The Lesson on the Area of a Trapezium
This lesson was conducted in Standard Seven in one of the primary schools in Kenya. The teacher began by stating the following, *"Yesterday we learned about the area of a parallelogram. What did we say about the area of a parallelogram?"* The learners raised their hands and one after the other gave their responses. Some of the learners' responses were: "*length x width*", "*it has two sharp sides*", "*it has a dotted line*". This continued until one learner gave the answer the teacher expected (i.e. "*base x height*"). The teacher reinforced the learner and continued with the lesson. None of the other learners were allowed to explain their answers.

Our Reflection
The way this lesson began makes us wonder whether the teacher knew that learners' unique responses should not be ignored, whether correct or wrong. In addition, was the teacher aware that learners' unique responses could be a good opportunity to promote alternative ways of thinking and therefore enhance learning? Furthermore, was the teacher aware that allowing the learners to explain their answers could help detect a misconception that can be mitigated during the lesson?

Indeed, some of the answers the teacher ignored were correct while others indicate that the concept of area and particularly the area of a parallelogram was not well understood by some of the learners. The concept to be taught during this lesson was the area of a trapezium. However, the concept of the area of a parallelogram is a prerequisite for the understanding area of a trapezium. Therefore, the teacher needed to interrogate the learners' responses further. This would have helped her know why learners gave those responses and thus reorganize the lesson to help them understand the target concept and ensure that any misconception(s) are not carried forward to future learning.

As the lesson progressed to the development stage, the teacher asked learners to look at a diagram of a trapezium in one of the textbooks. The teacher then posed the following question; "*What is the difference between a parallelogram and a trapezium?*" Given that the teacher had previously ignored some of the learners' responses, no learner raised his/her hand to respond. Thus, the teacher went ahead and answered the question then continued with the lesson. He used two diagrams of a trapezium to give the formula for the area of a trapezium as shown in Figure 1.

The teacher derived the formula and then explained it to the learners who sat quietly listening. The teacher did not encourage the learners to give their ideas on how to derive the formula for the area of a trapezium. At this point, it was clear that some of the learners were not together with the teacher as they wore faces of boredom. All the same, the learners were asked to copy in their notebooks what the teacher had written on the blackboard before concluding the lesson.

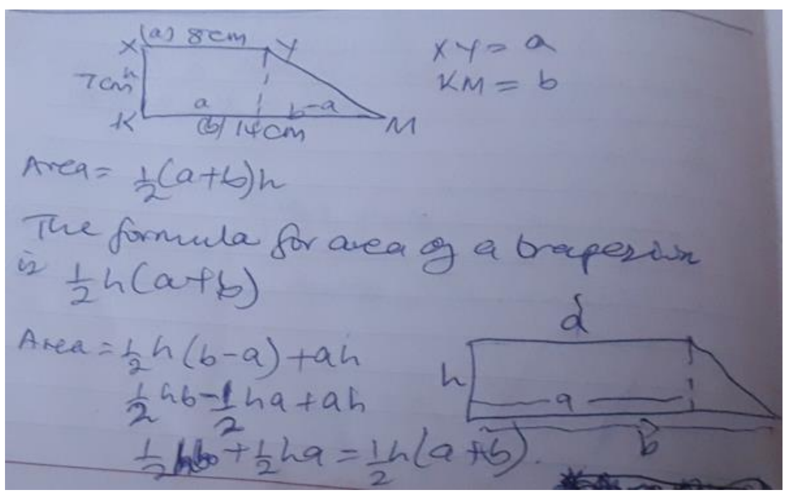

Figure 1: The teacher's work on the Area of a trapezium

Using Learners' Unique Responses to Support their Learning.
Quite often, teachers overlook learners' responses that are different from their expectations – those arrived at using different procedures and wrong ones; while correct answers are reinforced (Metcalfe, 2016). Reinforcing a correct response is an indicator that the teacher is the authority who

gives rewards and does not allow the learners who give wrong responses to reflect, re-examine and re-assess their thought processes (Stevenson & Stigler, 1992). Consequently, learners who give wrong responses feel discouraged and may lose interest or shy away from active learning. It is important to allow learners to explain their answers because it creates a learning opportunity for the learner and it also promotes learning for others. Furthermore, it points out how a learner is thinking about the question asked and provides valuable feedback to the teacher. Indeed, unique responses given by learners could be as a result of teaching and learning methods used by the teacher, as well as learners' way of understanding and reasoning (Amalina & Jupri, 2017).

In the lesson on the area of a trapezium, one of the responses ignored was unique, that is, the area of a parallelogram is determined by the formula *length x width.* The teacher expected the response *base x height,* but is the response *length x width* necessarily incorrect? The teacher should have allowed a class discussion to interrogate this response to elicit the learners' alternative ways of thinking. The learner who gave this response could have been allowed to explain his thinking and engage others in a discussion to understand that thinking. Ideally, the formula for finding the area of a parallelogram is derived from the area of a rectangle as shown in Figure 2.

In the diagram, a triangle ABE is cut off from rectangle ABCD and attached to line DC, the figure obtained is a parallelogram whose base is equivalent to the length of the rectangle. Similarly, its height is equivalent to the width of the rectangle. Using this illustration, the learners can understand how a rectangle can be transformed into a parallelogram and the relationship between their areas, hence the unique response of *length x width.*

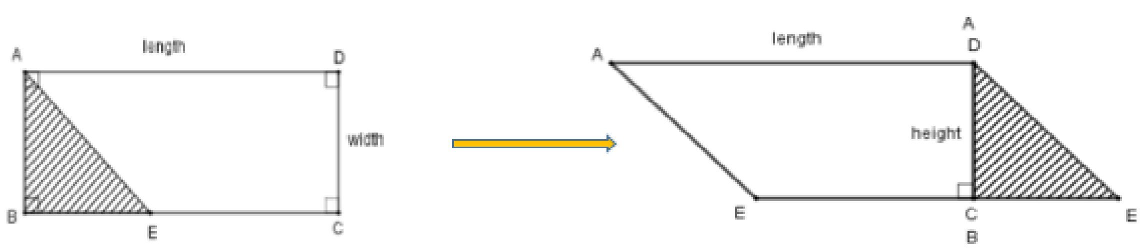

Figure 2: Formula for finding the area of a parallelogram

Extending Learning using Learners' Unique Responses

From the unique response discussed above, the teacher should now be able to guide the learners to link the prerequisite knowledge to the current knowledge to be taught as well as to future knowledge. For example, the knowledge on how to derive the formula for the area of a parallelogram can be developed further to derive the formula for the area of a trapezium. We illustrate this using Figure 3.

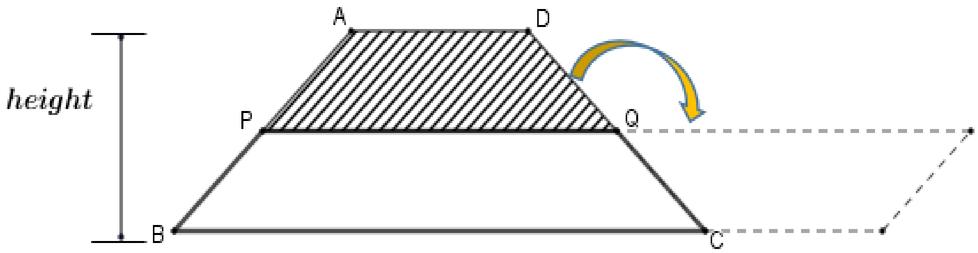

Figure 3: A transformed trapezium

Figure 3 shows trapezium ABCD with side AD parallel to BC. The formula for the area of the trapezium can be derived from the prior knowledge on the area of a parallelogram as seen from the previous section. This can be done by drawing line PQ equidistant to the parallel lines AD and BC to form two trapezia whose height is half the height of the original trapezium. If trapezium APQD is moved to the right and inverted as shown in Figure 3, the resulting figure is a parallelogram (see Figure 4).

Figure 4: Formula for finding the area of a trapezium

The area of the transformed trapezium is equivalent to the area of the resulting parallelogram in figure 4 above. This is given by;

Area of trapezium = area of resulting parallelogram = *base x height* = *BA x ½ height*
But the base *BA* = *AD* + *BC*, and the *height* = *½ height*. Hence;
Area of trapezium = *(AD + BC) x ½ height* = *½ (AD + BC) height*

From this example, it is clear that learners' unique responses can promote alternative ways of thinking and enhance a deeper understanding of mathematical concepts, and therefore such should not be ignored.

Conclusion
In this article, we have reflected on how one lesson targeting learners to understand how to determine the area of a trapezium progressed. We have shown how one response given by a learner at the initial stage of the lesson was ignored and yet, the teacher could have drawn on it to support learners and extend their understanding. To ensure that learners are engaged in meaningful learning throughout the lesson, a teacher needs to anticipate learners' responses. This helps the teacher plan how to deal with learners' unique responses during the lesson. It also helps the teacher to be able to address misconceptions that may arise. This can be done by allowing the learners to not only present and explain their ideas but also to correct their mistakes as well as

learn from each other's mistakes. The teacher can then lead the learners to conclude using their unique ideas.

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