



HOLISTIC
LEARNING
INNOVATIONS

SPINNING POSSIBILITIES

Country: Uganda

Target Age: 15 Years

Learning Areas: Building Confidence | Communication
| Creativity | Critical Thinking | Literacy

THE CONTEXT

Mvara Secondary School

Mvara Secondary School is located in Arua City, Uganda, with approximately 75 students per class and a total school population of 1400. The surrounding community faces challenges such as low incomes, reduced food availability, and diminishing agricultural productivity. The school itself experiences increased heatwaves and high temperatures, along with a reduced water table from nearby water sources.





Pinning of the straws on the cartesian board with marked lines by students after classes
Photographer: Zanvacia Grace

THE CHALLENGE

How might we customise learning materials to support hands-on understanding of translations and vectors?

Many students demonstrated a basic understanding of plotting points but struggled to translate object points into image points on a Cartesian graph. Despite attending lessons, several were unable to clearly explain vectors and translations to their peers, revealing gaps in comprehension. Classroom exercises and observations showed that learners often avoided using graph paper, even though it was required, and many lacked confidence when plotting and translating points.

Overall, learners found vectors and translations challenging and intimidating. The perceived complexity of the topic led to hesitation, fear of making mistakes, and low participation in class discussions. As a result, students rarely articulated their reasoning or engaged collaboratively. The key challenge, therefore, was to demystify vectors and translations—transforming them from abstract concepts into engaging, accessible ideas that students could confidently explore and apply.

THE SOLUTION

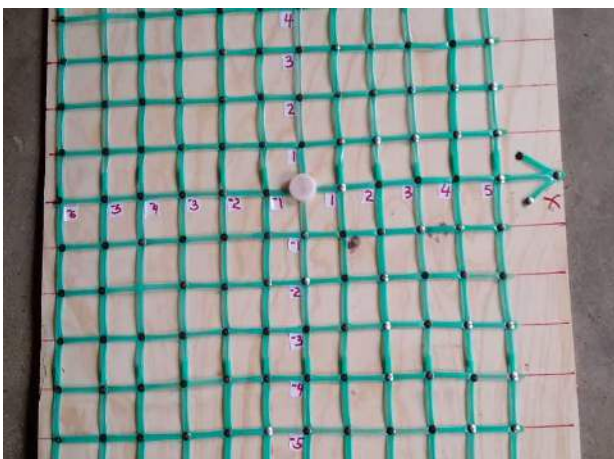
Spinning Possibilities

Spinning Possibilities is a creative learning tool that uses a Cartesian board and spinning wheel to teach mathematics concepts in an interactive way. The innovation makes abstract concepts like vectors and translations more concrete and engaging, while creating an inclusive, active learning environment. It is designed for learners aged 9 - 18 years.

Materials Used:

- Double-layer plywood
- Straws
- Pins
- Paint
- Plasticine/gum
- Threads
- Digital printouts of numbers (1–10)

Initially, the school had only one Cartesian board for many students. Later, the administration provided financial support for the students to produce more boards, increasing access and participation.



A simple cartesian board designed by students
Photographer: Zanvacia Grace



S.3 students designing their own cartesian boards for use during lessons
Photographer: Zanvacia Grace



S.2 students using the cartesian graph for vector translation
Photographer: Grace Zanvacia



Cartesian board after use for teaching similarities and enlargements in the classroom
Photographer: Zanvacia Grace

THE IMPACT

More confident, engaged students with better knowledge retention

Over the past 18 months, the innovation has been implemented in six schools and eight classrooms, benefiting both regular learners and those with visual impairments. Students now show greater confidence and participation in mathematics lessons, and the tool has encouraged collaboration, creativity, and problem-solving.

Assessment evidence indicates improved learning outcomes and stronger peer-to-peer support, while classrooms have become more inclusive and interactive environments.

“During examinations, we won’t be able to forget vectors because something done practically is remembered faster than something done theoretically.”

Aker Atem, Student S.2

“Before, I used to hear about the x and y axes but I didn’t know what they were. Now I know how to plot everything on it”.

Al-nasib Rasul, Student S.2

THE IMPACT (CONTINUED)

Students have demonstrated clear changes in how they approach mathematics. They are more confident in applying new knowledge, show greater willingness to work together, and are developing stronger critical thinking skills. Many now find graph work easier to understand and complete, and there is a noticeable increase in curiosity and engagement when new materials are introduced.

These improvements have also influenced the classroom atmosphere. Lessons are more learner-centred, with higher levels of attention and consistent participation from all students, including those with visual impairments. Overall, the innovation has contributed to a more inclusive and collaborative approach to mathematics learning.

Meet the Teacher



Zanvacia Grace

Teacher

About me

Grace is a secondary teacher of Mathematics and Physics in Mvara Secondary School located in Arua City in the West Nile Region of Uganda. She is passionate about teaching as and helping her students learn mathematics with joy, particularly understanding concepts with ease. She hopes to become a lead educator in influencing school based innovations geared towards solving real world problems.



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