



PENREACH STEAM COMMUNITY OF PRACTICE MEETING: OVERVIEW

Date: 31-08-2021

1. PRESENTATIONS

1	Title	Introducing the Flux Space
	Presenter	Ryne Anthony
	Organisation	Flux Space
	Key Theme	Learnings from maker spaces and non-traditional STEM programmes
2	Title	Exploring the Govan Mbeki Mathematics Development Centre MathArt Competition
	Presenters	Carine Steyn Head
	Organisation	Govan Mbeki Mathematics Development Centre (Nelson Mandela University)
	Key Theme	Nurturing creativity and motivating learners towards maths and sciences

2. MAIN DISCUSSION POINTS FROM PARTICIPANTS

Number of participants: 59			
Presentations:			
Research shows that there's a positive influence in including art in the performance of learners and the development of STEM subjects.			
 Everybody defines STEM differently and for FLUX, STEM is about understanding how the world works to solve problems. 			
 The FLUX space model aims to create a space where people are continuously learning alongside each other to figure out what could be a better STEAM learning experience. 			
Issues/Concerns:			
 It's challenging for many people to see the value of maths arts collaboration. 			
Useful Resources shared:			
 STEM generating prompt tool - <u>http://Sharpern.design/stem</u> 			
FLUX STEAM challenge - <u>https://fluxspace.io/fluxosc/</u>			
 Drone Core (powered by Alyson) technology for problem solving - <u>https://asylonrobotics.com/</u> 			

Setting the Scene

PENREACH STEAM programme manager, Cheryl Williams, set the scene for the day's proceedings by welcoming participants and partners to the CoP; sharing the day's agenda and orienting participants on the virtual meeting platform, Zoom and its features. Participants were invited to check into the meeting by sharing an emotion icon (also known as emoticons and emojis) that best illustrated how they feel in the chat box found on, Zoom.

Presentation 1: Ryne Anthony Director of Innovation at Flux Space (USA)

Ryne Anthony, a former science teacher, got into maker spaces and STEM programmes as non-traditional ways of engaging students after teaching for 10 years. Ryne is passionate about teaching and helping students find their passion. This passion was formalised about four years ago in Pennsylvania where the FLUX space is located.

To introduce the work done at Flux, Ryne took meeting participants on a virtual tour of the FLUX warehouse



Figure 1 Ryne Anthony Conducting a Virtual Tour of FLUX

facilities, sectioned off into different areas. These areas are deigned to get educators to get more excited about a particular area of STEM and craft new ideas of what learning could be, in a safe yet experimental way. The FLUX warehouse comprises of a makerspace area, vertical garden setups for hydroponics, a culinary arts section, a communal area, used large group meetings and an immersive learning environment for projection mapping, using virtual reality technology

About Flux

"It's not so much about what you want to do, it's more about what you what to be. What do you want to wake up doing every day? what skills might you need to accomplish that? " – Ryne Anthony The idea behind FLUX was to create a STEM incubator; be a useful resource to the community and the schools and provide a safe space for teachers to explore what STEM education could be. FLUX sees itself as a collaborator in STEM rather than as expert. To this end, the FLUX model aims to create a space where people are continuously

learning alongside each other to figure out what could be a better learning experience. Through this approach to learning, FLUX is also able to help students determine what kind of career they want to go into.

Getting to STEM

Everybody defines STEM differently and for FLUX, STEM is about understanding how the world works to solve problems. The content part of school and what learners need to recall is about understanding how the world works. STEM experiences equip learners with the necessary skills and confidence to solve complex problems. While STEM experiences are generally known to succeed at developing individuals to create innovative solutions to solve

complex problems; what is often missing from the conversation is the importance of thinking about this as a collaborative undertaking. At the heart of the integration of the arts in STEM education lies a culture of producing, making and creating artefacts and prototypes for testing out ideas and concepts.

"STEAM education is a mindset, an experience, a process, a movement for all classes, all grades, all levels and all zip codes." Ryne Anthony

STEM + Arts = STEAM

A = Arts = producing/making/creating

Producing artifacts, models, prototypes, "Art" to communicate/test concepts and ideas.

STEAM = Benefits of STEM + integrating principles of production, creation, application in and through the arts.

Figure 2 Presentation Slide - Ryne Anthony

While the trend in schools is to reserve STEM education for more academically savvy students, students who are struggling academically actually need STEM more from a career readiness perspective. These trends can be likened

to forcing children to read (through remedial reading programmes) as opposed to helping them to enjoy reading. FLUX's main goal is to support student centred learning- in other words, learning environments and experiences where students move from being passive receivers of information to being active participants in their own discovery process.

Facilitating the discovery process includes:

- STEM integration incorporating STEM education in curriculum
- Engineering Design Process design challenges using a given set of materials
- **Project Problem Inquiry Based Learning** developing unit plan in projects that students are going to complete and or in problems that they are going to solve.
- Empathy and design thinking as demonstrated through the IDEO design challenge example, empathy is central to effective design thinking.

A Closer Look at Design Thinking

Design thinking is defined as a process for creative problem solving. Drawing on a design thinking example from the Book Ten Faces of Innovation, Ryne argued that educators and practitioners need to make it culturally acceptable to show off ideas at the rough and early stages. With STEM and STEAM education, students need to be comfortable enough to explore and experiment and that can be done by reassuring them that no idea is bad and no question is bad. The design thinking example used demonstrated that using simple material such as cardboard and glue, in other words creating a rough prototype, can be a successful way of getting ideas across. FLUX uses design thinking in various ways a design thinking challenge where participants are tasked with solving world problems ranging from a smaller challenge, such as the mighty handle designed to help carry shopping bags; and more complex challenges linked to global goals for sustainable development

Questions and Answer

Q: One of our challenges is to attract philanthropic investors to fund this. What is the cost estimate of the investment in equipment and usables per annum so far? Did you see a phased approach and if so, how did you make the choices? Do you have a master for the development plan?

A: We're a for-profit company and the FLUX Space's model is to break even. The parent company's main business is in helping schools, universities and offices redesign spaces, in other words furniture implementation; while FLUX is more focussed on the learning environment and on what the learning experience should be. This model allows any non-profit and partners in the community to benefit from the work done at FLUX.

Presentation 2: Carine Steyn Head of MathArts Competition at the Govan Mbeki Mathematics

The Govan Mbeki Mathematics Development Centre (GMMDC) National MathArt Competition was developed to help learners and with mathematics and physical sciences, while emphasizing the role of creativity, innovation and teamwork in problem solving. As soon as the idea of combining Maths and Arts is introduced, in any context, the big question is always- can these two disciplines be interlinked? The MathsArt competition challenges society look at things differently.



Figure 3: Presentation Slide - Carine Steyn

The idea of drawing linkages between Maths and Arts is not a new. In fact, it can be traced as far back as the collaboration between Italian Mathematician, Luca Pacioli and Leonardo Da Vinci, amongst others.

The MathArt Competition

The Maths Arts Competition emerged in 2017, as a result of the international trends towards STEAM. Research shows that there's a positive influence in including art in the performance of learners and the development of STEM subjects. Furthermore, it has become increasingly important to think creatively and produce innovators: people who will take the challenges that we have and think about them differently. Not only does the MathArt Competition draw attention to this, but it also encourages people to look at mathematics and art in a different manner. The integration of these two disciplines and a willingness to recognise the overlaps has the potential to yield much richer outcomes.

The competition runs annually and is open to grade 7-12 learners in South Africa, Lesotho and Swaziland. Learners are required to create a 2D artwork using maths, linked to a theme. The competition's goal is to address the need for a low threshold, affordable and equal access to STEAM support programs. Through this competition, the GMMDC hopes to nurture creativity and motivate learners towards maths and sciences; while bringing recognition to learners and teachers from poorer communities and under resourced schools. The artworks are judged by a transdisciplinary team and the criteria is on both the artwork and the written work, but not so much on artistic technique and the correct use of English. Carine concluded by showing a selection of art works from 2018 to date.



Figure 4: Presentation Slide – Carine Steyn

Questions and Answers

Q: What is your approach to taking the MathArt competition to the grassroots, for example collaborating with NGOs?

A: We tend to approach education departments and schools directly. In instances where there are existing relationships with NGOs, we reach out to them as well. We are open to collaborations and we can be contacted on mathart@mandela.ac.za

Q: How do you get maths and arts departments in schools (and curriculum advisors) to think differently about collaborating while meeting curriculum requirements?

A: It's challenging for many people to see the value of maths arts collaboration, so we try to stimulate them to take this on as a project that can be done in classes. However, we don't just want this to be a maths and arts project- we want the two disciplines to talk to each other.

Close Out

The CoP facilitator brought the meeting to a close by thanking participants and presenters for the invigorating presentations. The next CoP date will be announced in due course.

The CoP is reminded of BRIDGE's knowledge management role. All meetings, presentations and discussions are captured and shared on BRIDGE's Knowledge Hub. To view, follow this <u>link</u>.