WHAT IS THE NATURE OF STEM LEARNING IN JUNIOR SCHOOL MAKERSPACES? A CROSS-CASE ANALYSIS

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THEME:

Engaging students in STEM education

BACKGROUND AND AIMS

In recent years, many schools have developed Makerspaces as a means of fostering students' STEM-related knowledge and skills. Typically, activities in these spaces involve students in practical work designing and creating artefacts, models and mock ups responding to problems, needs and opportunities, often working collaboratively using a range of materials, tools and equipment. Much literature associates these activities with developing STEM discipline conceptual knowledge and a variety of so-called '21St Century' competencies such as problem solving, critical and creative thinking, teamwork, communication and other social skills.

METHODOLOGY OR PROCESS(ES) UNDERTAKEN

This paper interrogates these perspectives through empirical investigation of data collected in 24 K-2 primary classrooms, where students engaged in Making activities using 3D design and printing technologies. Data were collected using multiple methods including lesson observations, focus group interviews, questionnaires, blog posts, teacher reflections, unit planning documents, and student work samples (designs and artefacts). They were analysed to identify the extent to which teachers and students engaged in opportunities to learn or apply STEM concepts.

RESULTS AND CONCLUSIONS

Results indicated that while most Makerspaces projects held considerable potential to learn STEM concepts and that many of these were integral to producing successful outcomes, very few teachers explicitly identified, planned, and taught for these, instead emphasising 'soft skills' as prioritised outcomes. These results challenge the popularly-held notion that Makerspaces are natural environments within which students will intuitively learn STEM concepts and signal the importance of teachers recognising and targeting specific STEM concepts both as outcomes from, and integral to, maximising Makerspaces learning. While results indicate Makerspaces can be effective epistemic environments where students can build knowledge of STEM and how it contributes to solving problems, teachers must be mindful of their limitations as an innate vehicle for learning about STEM. If STEM discipline knowledge is a goal of Makerspaces curricula, opportunities for this must be recognised, and if necessary, concepts explicitly targeted and taught integral to Making activities. Given current educational moves towards tighter reporting against standardised metrics, and increased, content-focused curriculum accountability, if Makerspaces are to establish themselves in schools, their contribution to meeting these outcomes must be more clearly identified.

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REFERENCES

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