Network for Information and Digital Access

The impact of Science Literacy delivery methods - what works?

Gaps in impact assessment methodology

GROUP 4. Activities and services

V 1.0 | 28 March 2019

GROUP 4. Activities and services					
Mechanism	**Subject and keywords**	**Gaps in the impact assessment (IA) methodology Lack of (or insufficient):**	**Possible methodological improvement(s) /Recommendations / Directions for future research**	**Challenges**	**Reference**
30. Competitions					**NO REVIEWS**
31. Experiments (Laboratories)	Education [Social science]	- **breadth and depth of IA methodology**	- in order to truly assess the depth of the KIPPAS [a 6-category tool: Knowledge and Understanding; Inquiry Skills; Practical Skills; Perception; Analytical Skills; Social and Scientific Communication] outcomes, alternative assessment instruments besides the six aforementioned could be used to gain richer understandings of what students are thinking and how they construct meaning. Examples might include concept mapping, illustrations, a lab journal, KWL (know, want or will, learned) charts, model construction or a portfolio		**Learning Outcome Achievement in Non-Traditional (Virtual and Remote) versus Traditional (Hands-on) Laboratories: A Review of the Empirical Research** Brinson 2015
32. Makerspaces (from working paper)	Science and Science education [Interdisciplinary science, Social science]	- **empirical research evaluating makerspaces and making** (Hsu, Balwin, and Ching 2017), **and makerspaces and learning** (Litts 2015; Marshall 2016) - **formal methods and techniques to assess the outcomes of makerspaces** (Gahagan 2016) - **methods that capture the effects of makerspaces' service on users**. E.g. current traditional formal reporting relies upon quantitative measurements, such as counting visitor or participant numbers. Nevertheless, there is potential for qualitative data to be	- learning through making demands new forms of assessments since the current tools simply do not capture the complex interdisciplinary learning taking place in makerspaces (Litts 2015) - as makerspaces are proliferating, it is imperative for researchers and practitioners to build a better understanding of these spaces as learning environments and of the making that happens within them (Litts 2015). The learning taking place in makerspace	- ethos of personal creativity and learner-centeredness in digital fabrication facilities creates a dilemma for assessment as the interventions are open-ended and creative (Blikstein et al. 2017). Traditional assessments of science and technology do not capture the particular	http://www.nida-net.org/en-gb/activities/connectwithscience/research/reports-and-bibliographies/makerspaces/

		collected more formally to corroborate quantitative data and structure assessments (e.g. by using a combination of methods to bring data together to demonstrate the outcomes, such as interview data and observational data, matched with attendance or visitor statistics) (Gahagan 2016)	settings is often influenced by factors other than those that traditional formal assessment tools measure (McCubbins 2016), therefore there is a need to develop appropriate tools of design, assessment and analysis (Litts 2015) and to overcome many challenges that still exist in finding ways to measure the impact of informal learning environments (McCubbins 2016) - understanding the complexity of a makerspace warrants a mixed-method approach in order to capture, for instance, the vibrancy of the space and the impact on participating students (Tomko et al. 2017) - improvements in the formalised approach to outcomes assessment could bring greater validity and reliability to the techniques being used, including clearly articulated objectives or intended outcomes, appropriate techniques and instruments, consistent approaches, scheduled frequency of the assessment and reporting (Gahagan 2016) - a learning-centered assessment according to learners' individual goals by using design stance, i.e. "makers' perspectives toward their making", could be used as an assessment tool. However, this tool requires a more flexible perspective towards assessment than the traditionally fixed and standardized perspective dominating the education system (Litts 2015) - variations in learning amongst students present a challenging scenario for an	type of learning in which students are engaged in fabrication settings, nor do they reflect that the learning in such settings is grounded in developing competence with digital fabrication tools - teacher training gap in using makerspaces can result in missed opportunities for grade level-connected learning (Ortega 2017) - access to the benefits of makerspace facilities might be unevenly spread and, although makerspaces are open to all, many of the people making use of these facilities could be early adopters with technical or creative backgrounds and for a large proportion male	

			assessment instrument but as well an exciting development for educators because they provide opportunities for peer teaching and models of leadership where all involved have knowledge to share (Blikstein et al. 2017). In makerspaces, the nature of learning is not located in a single individual but across individuals as they share knowledge and solve problems. Thus, distributed expertise rather than being an inconvenience to assessment could be seen as a new standard for evaluation. These peer learning interactions can challenge researchers to look not only at what students can accomplish on their own but at what they can achieve amongst themselves where they become resources for each other in accomplishing their creative work		
33. Mobile classrooms					**NO REVIEWS**
34. Mobile Laboratories					**NO REVIEWS**

Bibliography

Brinson, James R. "Learning Outcome Achievement in Non-Traditional (Virtual and Remote) versus Traditional (Hands-on) Laboratories: A Review of the Empirical Research." Computers & Education 87 (September 1, 2015): 218–37. https://doi.org/10.1016/j.compedu.2015.07.003.