A TOOL FOR HELPING EDUCATORS EVALUATE THE LEVEL OF INQUIRY IN LABORATORY ACTIVITIES

Alexandra Yeung[a,b,c] ,Manjula D. Sharma[a,b], Scott H. Kable[d], Louise Sutherland[e]

Presenting author: Alexandra Yeung (alexandra.yeung@curtin.edu.au)
[a]Institute for Innovation in Science and Mathematics Education, The University of Sydney, Camperdown NSW 2006, Australia
[b]School of Physics, The University of Sydney, Camperdown NSW 2006, Australia
[c]Department of Chemistry, Curtin University, Bently WA 6845, Australia
[d]School of Chemistry, UNSW Sydney, Kensington NSW 2052, Australia
[e]Faculty of Education and Social Work, The University of Sydney, Camperdown NSW 2006, Australia

KEYWORDS: inquiry-based learning, laboratory activities, science education

BACKGROUND

Learning science by doing experiments features in the Australian Curriculum: Science as well as university settings. The nature of the experimentation varies immensely, from open-ended to recipe based practical activities. While doing experiments attempts to capture the notion of scientific inquiry, it is a challenge to share understandings of what constitutes inquiry, since there is no universal or concrete definition of science inquiry. Consequently, educators have difficulties understanding how to design, implement and evaluate inquiry-based activities that best engage students and help them learn science. Instead, practitioners tend to create their own working definition of inquiry based on their needs (Buck, Bretz, and Towns, 2008). According to the National Research Council (NRC, 1996), "Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Inquiry also refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world." Based on this articulation and further research, a framework has been developed and trialled by practitioners (National Research Council, 2000; Asay & Orgil, 2010). Using this framework, we have developed a tool that can be used to integrate inquiry in practical activities. This presentation will describe this tool its utility in curriculum.

APPROACH

The Advancing Science by Enhancing Learning in the Laboratory (ASELL) project has run workshops for over 100 teachers. In the workshops teachers evaluate the level on inquiry of the experiments using the ASELL Inquiry Scaffolding Instrument (AISI) tool based on the framework discussed above. An exemplar inquiry experiment is used to benchmark an open-ended inquiry while most teachers are familiar with recipe experiments.

RESULTS

Our results show that teachers find the multitude of definitions of inquiry teachers challenging. Further, quite often the definitions are of limited use in the classroom. Despite this confusion, when utilising the AISI, teachers have fairly consistent understandings of inquiry, as shown by statistics. Teachers found the tool useful and would use the tool in their curriculum. Many also said it was a simple tool to use to help them modify their existing experiments and develop them into more inquiry-based experiments.

CONCLUSIONS

A concerted effort is needed to provide sound and practical tools to help teachers incorporate inquiry in their experiments. The AISI is one such tool that has been found to be useful for increasing the level of inquiry in practical activities.

REFERENCES

Asay,L.D.,& Orgill,M. (2010). Analysis of essential features of inquiry found in articles published in The Science Teacher, 1998-2007. *Journal of Science Teacher Education, 21*, 57-79.

Buck,L. B.,Bretz, S. L.,& Towns, M. H.(2008). Characterizing the level of inquiry in the undergraduate laboratory. *Journal of College Science Teaching, September/October,* 52-58.

National Research Council (1996). *National science education standards*. Washington, DC: National Academy Press.

National Research Council (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington DC: National Academic Press.

Proceedings of the Australian Conference on Science and Mathematics Education, University of Sydney, Sept 29th to Sept 30th, 2014, page 97, ISBN Number 978-0-9871834-3-9.