American Geophysical Union (AGU) 2021 Session ED25B: Finding the Value of Educational Experiences: The Art and Science of Evaluation. Published Abstract

A Case for Retrospective Pretests in Young Learner Research Designs

Authors: Gerald Knezek, University of North Texas, Learning Technologies, Denton, TX, United States and **Rhonda Christensen**, University of North Texas, Denton, TX, United States

Findings from 2021 SciQuest summer camps hosted at the Dallas Arboretum in conjunction with the University of North Texas are featured in this presentation. Topics include technology-based space science activities made possible through support from the NASA Heliophysics Education Activation Team (HEAT). Augmented Reality, Virtual Reality, and 3D printing were used to provide engaged learning activities about the sun, space weather and its influence on earth and space travel during camp activities each spanning one week.

Pre-post tests and surveys with content and disposition indicators, together with end of session, retrospective pretest Likert items, were gathered from 16 participants and used to assess the impact on gains in knowledge (K), interest (I) and attitudes (A) or dispositions, in keeping with the BASIK framework (Davis et al, 2018; Freidman, 2008) for evaluation of outcomes. Major findings were: a) significant ($p < .05$) knowledge gains with an effect size of Cohen's $d = .60$ (Cohen, 1988); b) significant ($p < .05$) gains in interest in space science as a subject and/or career, based on analyses of perceptions after the event.

Finding from 2021 SciQuest summer camp retrospective pretest data strongly align with retrospective pretest findings from a similar weekend camp conducted for 21 grade 6 students one year earlier (Christensen, 2020), and are also consistent with results obtained by the authors in similar contexts over the past five years (Knezek & Christensen, 2020). It appears that children in the age ranges of grades 2-7 often do not have a well-formed concept of what they are rating on pretest surveys, while once children have been through the learning experiences they usually have a firm opinion of how much they liked the activity and can reflect on before versus after the event.

American Geophysical Union (AGU) 2021 Session ED25B: Finding the Value of Educational Experiences: The Art and Science of Evaluation. Published Abstract

Evidence is accumulating that retrospective pretests as research methodology are worthy of much wider utilization in research designs.

References

Christensen, R. (2020, April). Sanger Saturday Camp 2020 Pre-Post Report. Denton, TX: Institute for the Integration of Technology into Teaching and Learning.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum.

Knezek, G., & Christensen, R. (2020). Researching impact: Measuring technology enhanced outcomes from the NASA Space Science Education Consortium. Journal of Computers in Mathematics and Science Teaching (JCMST) 39(4), 399-420.

Davis, H.D., Scalice, D., Young, A., Mayo, L., & Davey, B. (2018). Measuring effects across NASA space science education consortium activities using NSF impact categories. DC: American Geophysical Union.

Friedman, A. (Ed.). (2008). Framework for evaluating impacts of informal science education projects. http://insci.org/resources/Eval_Framework.pdf.