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Overview

A member of ORAU requested information on how organizations using technology-assisted education/training assess the efficacy of these methodologies over more conventional, classroom-based instruction when it comes to developing competency in critical thinking (CT).

Findings

HDIAC identified several methodologies for assessing CT competency in online/technology-based education programs.

University of Belfast

Researchers at the University of Belfast developed a methodology comparing improvements to CT gained from traditional classrooms and technology-assisted learning [1]. The framework of this methodology uses Garrison's definition of CT, which is the analyzing of situations through the integration of "new ideas with previous knowledge and experience [2]." This approach used student self-evaluations to dichotomously rate the contribution of a technology-assisted lecture to their CT [1]. Students responded with a "+" (positive) or "-" (negative) rating for each of Garrison's CT Stages and corresponding Henri Critical Reasoning Skills, listed in Table 1.

Garrison's CT Stages	Henri's Critical Reasoning Skills
1. Problem identification	a triggering event arouses interest in a problem
2. Problem definition	define problem boundaries, ends and means
3. Problem exploration	ability to see to heart of problem based on deep understanding of situation
4. Problem applicability	evaluation of alternative solutions and new ideas
5. Problem integration	acting upon understanding to validate knowledge

Table 1: Garrison's CT stages, adapted from [1].

After students completed the self-evaluation, positive and negative codes were totaled and entered into the formula $\text{Depth of CT ratio} = \frac{(x+ - x-)}{(x+ + x-)}$ to determine the "[CT] ratio [1]." A paired t-test measured the overall differences in CT gained from traditional versus technology-assisted learning, and an analysis of variance (ANOVA) measured the differences in each of Garrison's CT stages among students.

Concordia University

Researchers at Concordia University developed a self-evaluation method for assessing CT improvement related to various course components (textbook, online book, assignments, overall online course system, quizzes, etc.) [3]. With this methodology, students evaluated the contribution of each different course activities, resources, and technologies to CT development. Student perception was measured on a three-point scale (a lot, somewhat, or not at all) for each course element [3]. Researchers used ANOVA and the Tukey-Kramer statistical method to determine if significant differences exist across mean pairs [3].

Conclusion

HDIAC identified comparison of student self-evaluation with statistical methods, including paired t-test and ANOVA, as tested methods for comparing the impact of online/technology-based education and traditional methods on improving CT.

We request your feedback on this Inquiry: <https://www.hdiac.org/new-inquiry-assessment-form/>

References

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