GlobalEd 2: a Technology Mediated Simulation Targeted at Writing in the Disciplines

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Abstract: Leveraging technologies commonly available in most middle grade classrooms, GlobalEd 2 targets an interdisciplinary approach to learning writing, science, and social studies. GlobalEd 2 engages classrooms of students in the simulated negotiation on issues of global concern such as water scarcity and climate change. This presentation details the impact of interactions within the simulation on 420 7th and 8th grade students. Results indicate that after participation in a GlobalEd 2 simulation, students not only increased their writing self-efficacy, but also significantly increased the quality of their written scientific arguments.

Introduction

One key construct shown to mediate academic performance in writing is self-efficacy (Bruning & Horn, 2000; Pajares, 2003; Pajares and Johnson, 1996). Self-efficacy is one's belief that he/she will be able to successfully complete a particular task (Bandura, 1986). A person's self-efficacy (a fluid construct that changes with experience) guides an individual's behavior by determining what he/she attempts to achieve and how much effort is put into his/her performance (Zimmerman & Bandura, 1994). That is, with an opportunity to experience success in a particular task, self-efficacy can be increased. As such, the more opportunities students are afforded to experience success in writing, the more chance there is to positively impact their writing self-efficacy and thereby their writing performance.

This presentation will report the results of a project, GlobalEd 2, developed, in part, to address the concerns regarding general writing self-efficacy and writing performance in the middle grades and specifically writing within the discipline of science. Using a problem-based approach, GlobalEd 2 targets an interdisciplinary approach to learning writing, science, and social studies. Teams of students from different classrooms interact with one another via an online communication system. Each classroom adopts the role of scientific advisor for their assigned country. Country teams operate under the goal of negotiating cooperative agreements within other "countries" participating in the simulation with respect to an issue of international importance such as water scarcity or global climate change. Communications are sent back and forth across teams a proprietary database system in the form of email and instant messaging. As such, communication across teams occurs both asynchronously and synchronously. Through professional development with the teachers, scaffolds and examples provided to the students and modeling of written communication through "planted" sophisticates within the simulation, GlobalEd 2 places a pronounced emphasis on the development of students' writing self-efficacy and their ability to construct evidenced-based scientific argumentation. GlobalEd 2 takes place during the regular school day, and the simulation lasts approximately 12 weeks. For more specific information about GlobalEd 2 and how the larger context of the simulation operates, please visit the website: http://www.globaled.uconn.edu/.

Methods

A total of 420 student participated in a GlobalEd 2 simulation during the fall of 2009. 312 of these students were from suburban schools located in New England, the remaining 118 students were from a large Midwestern city. All schools participating were public middle schools, with student drawn from both the 7th and 8th grades. Suburban schools were markedly higher with respect to socioeconomic status with fewer that 15% of participants receiving free or reduced lunches. Students from urban schools were significantly lower socio-economically, with over 80% of student receiving subsidies for lunches. There were 186 males and 236 females combined across both sites, with roughly equal distributions of genders within each site.

Prior to implementing the GlobalEd 2 simulation in their classrooms, teachers from both sites attended a 3-day professional development seminar to help them learn the specific foci of the curriculum, including writing and teaching scientific argumentation. Students within the trained teachers classrooms were asked to complete a battery of pre-test prior to being introduced to GlobalEd2. Within this battery was a 5-item measure of writing self-efficacy (Likert scale format, 1 representing low efficacy and 5 representing high efficacy) and an open ended writing prompt patterned after prompts students receive as part of state mandated standardized tests. This writing prompt asked students to write a persuasive argument either for against the claim that the Earth is in danger of running out of fresh water. They were asked to clearly provide a claim, provide evidence

for their claim as well as the reasoning they used to link that evidence to their claim. Students then began participation in the GlobalEd 2 simulation, which lasted for approximately 12 weeks. After completing the simulation portion of GlobalEd 2, student were re-administered the same battery of assessments as post measures of performance.

Writing self-efficacy items were summed to create one composite score pre and post for each student (possible range: 5-25). Student essays were scored by two independent raters, blinded to student identity and time of administration. An adapted version of the argumentation rubric developed by Midgette, Haria and MacAuthur (2007) was used to rate essays for quality of argumentation. The basic gist of this rubric examines the presence of claims, evidence and reasoning, the completeness of these argumentation chains as well as whether they addressed the opposition in their arguments (possible range 0-5). Given the difficult nature of scoring student arguments (Goldman, 2009), independent rater scores were taken as agreement when they were within one point of one another – this led to 95% agreement. These ratings were then averaged to yield a single argument score for each student's essay.

Results

To address the first research question, regarding writing self-efficacy of the overall sample, pre and post scores were analyzed using a dependent t-test. Results indicated a significant difference between pre and post scores ($t_{(415)}$=2.27, $p<.05$), with student indicating significantly more writing self-efficacy after participation in GlobalEd 2 than prior. This analysis was repeated for research question 2, examining the argumentation quality score derived from the open-ended essay responses provided by students. Results of this t-test also indicated a significant increase in scores from pre to post ($t_{(415)}$=9.89, $p<.001$). To further examine the impact of gender and socioeconomic status on student writing self-efficacy and argumentation quality over time, a series of ANCOVAs were run were pretest scores served as the covariates, post-tests as the dependent variables and gender and socioeconomic status as the independent factors. Results indicated significant differences between both gender and socioeconomic status with respect to writing self efficacy at the time of the post test after controlling for pre test differences on this construct ($F_{(1,410)}$ =5.90, $p<.05$; $F_{(1,416)}$ =3.97, $p<.05$). The results show while that students representing each strata changed positively over time, females and students from the urban setting were significantly more self-efficacious with respect to writing than their counterparts at the time of the post-test after controlling for pre-test differences. Regarding argument quality as measured by the open ended essays, no differences in the amount of change by gender or socio economic status were noted.

Conclusion and Implications

The results presented here speak to the potential of GlobalEd 2 as a meaningful context within which students can learn and practice their ability to construct written scientific argumentation. Students who participated in the simulation increased both their writing self-efficacy and their writing performance scores over the course of the curricular intervention. This was the case regardless of gender or socioeconomic status. While there is much still to learn about why this intervention produces these effects on student outcomes, we believe that it centers around the increased opportunities that GlobalEd 2 affords students to construct written arguments in a real world context, the application of knowledge to solve problems rather than recall information and the authenticity of the audience to which they are writing. Curricular implications regarding the utilization of writing intensive, interdisciplinary, problem-based instructional approaches like GlobalEd 2 will be discussed. In addition, supplemental information regarding implementation fidelity and individual classroom performance will be reported.

References

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