

Interactive comment on “Role-play simulations as an aid to achieve complex learning outcomes in hydrological science” by Arvid Bring and Steve W. Lyon

Anonymous Referee #2

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General comments: The paper contributes to the evidence that simulation and role play teaching techniques provide additional value to graduate education, especially in an interdisciplinary topic like water management. This is valuable because as the authors note, “formal evaluation of the effectiveness of the teaching method is lacking”. The description of the educational “experiment” and its outcomes is a little unclear and could use some editing.

Specific comments:

Introduction: Pg 3 Starting Line 15: Add some description of the purpose of the simulations to prepare the reader to comprehend the different student responses. It

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could be something like, “In an examination of a suite of learning simulations where students made resource allocation decisions, ...” or something more appropriate to those simulations. Pg 3 Line 24: consider replacing “knowledge” with “outcomes”
 Pg 3 line 26: everything after “outcomes” in the sentence is stated awkwardly and doesn’t seem to add value. Consider removing. Pg 3 Line 31: say something like “the simulation was good for producing learning outcomes separate from the traditional quantitative outcomes”. Otherwise it seems like you could mean that this study showed that simulations also helped with quantitative skills. From reading the rest of the paper, I don’t think you meant that. Pg 4 Line 6: Great point about the need for T-shaped professors. Pg 4 Starting line 10: Somewhere in the paragraph before the Methods or in the beginning of Methods state explicitly that you taught both the simulation experience AND the water balance projects in all classes throughout the years. A really robust experiment would be to see the outcome differences of doing the simulation OR something else. I assumed that was the case without the explicit description. Methods: Pg 4 Line 22: Mention the other less experienced teacher that taught the class that you mention later in the paper.

IWRM negotiation simulation: Pg 5 starting Line 1: Provide a full reference for the IWRM negotiation simulation. I wasn’t able to find it on the internet with the information provided. Pg 5 starting Line 6: Share a little bit about the topical content of the activity, like what they were specifically negotiating? Water allocations? Water quality regulations? Pg 6 line 6: You mention later that you could implement formal quizzes to provide motivation for students to learn additional material for the activity. What do you think about using quizzes to test what students learned from the simulation activity? You could ask them questions about what complex challenges arise in the real world to see if they learned anything. Results: Pg 6 Line 28: Insert summary of the findings. Basically, the simulation activity is as useful for teaching additional outcomes as the traditional teaching methods are useful for teaching quantitative outcomes. It’s interesting that the students would prefer for the activity to have direct application to the real world. That’s something to keep in mind for designing the most

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effective simulation activities. Discussion: Pg 8 line 29: Can you speak to any conflict from the fact that you had to delete some content from a traditional course to make time for the negotiation simulation? What quantitative material was not covered that would have been in a traditional course? Again, a robust experiment would be to test the learning outcomes from teaching that material instead of the simulation and seeing if students had better quantitative outcomes. This is the problem some people have with training some students to be T-shaped. They may not be able to go as deep in their field. Pg 9 Line 27: This has worked well in the activity designed to represent climate change negotiations called “World Climate Simulation”. Pg 10 Line 7-13: The challenge of trying to convey this learning outcome should be better stated. I think it would be something like: there is a potential for learning about other disciplines, but the activity does not guarantee it. Formative assessment in simulations: If the learning outcomes align well with the simulation outcomes, experiencing failure or success incrementally in the activity could provide formative assessment.

Technical corrections: For citations like the one on pg 3 line 27, take the authors names out of the parenthesis and only parenthesize the date since you are directly referring the name in the sentence. Pg 4 line 22: I think you omitted “professor” between “main” and “responsible”. Pg 10 Line 4: The first sentence is redundant and could be removed.

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