

# Review of: "Integrating Virtual Tools Into the Face-To-Face Teaching of Undergraduate Analytical Chemistry"

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**Potential competing interests:** No potential competing interests to declare.

## Integrating Virtual Tools into the Face-To-Face Teaching of Undergraduate Analytical Chemistry

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The authors compared face-to-face (F2F) and virtual teaching for undergraduate students in a course in analytical chemistry. Their findings indicated that the advances in virtual presentations made during the pandemic have proven to be advantageous to the future of teaching such courses. The hybrid approach of F2F with complementary asynchronous virtual tools was appreciated by both students, who saw the flexibility to review lessons at their appointed time, along with the professors, who were able to maintain the necessary hands-on laboratory experiences.

Other advantages offered by simulation software are to present some very engaging circumstances: virtual activities also provide the opportunity to give examples of dangerous/explosive chemicals, chemicals with high toxicity, and the use of expensive reagents that would not be practical for use in a typical academic analytical laboratory but will allow students the opportunity to experience situations that they might encounter as part of their future employment.

The manuscript is well written and will be advantageous to any program that is having difficulty securing a place for appropriate integration. I would make one minor change in the use of vocabulary. I understand what you mean by the use of "practical," but I also see where the virtual experience is also "practical." To differentiate between the virtual practicum and the F2F practicum, I would appreciate the use of bench work. You could also use "wet bench," but that is probably not needed by readers who understand analytical chemistry. I also made a few other minor edits on the attached pdf. On the Supplemental attachment, I do wish that you would be consistent. For example, use ml or mL, not a mix; use periods or commas for decimals, but not a mix. I have edited the SI document with my favorite. Feel free to go the other way. Remember, your work might be published for the whole world to see!

I am not familiar with this journal but was asked to review this manuscript based on my expertise in teaching chemistry. If this information is new to this journal, then 5 out of 5 stars is recommended, and the information described should be extended to your readers, but if it is not new or novel to this journal, then I would only give this work 4 out of 5 stars.

