Scaffolding with Technology

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Introduction

- Scaffolding is providing support to students while they attempt to solve problems that they could not complete on their own (Holliday, 2001). A study found that with instructor support, students receiving continuous computer-based scaffolding performed better at learning scientific inquiry skills than students who did not receive scaffolding (Wu, 2010).
- JMOL, KING, and PDB Ligand Explorer are relatively new programs aimed at helping students visualize protein 3D structure. This study looked at the effect of scaffolding protein viewing tools with instructor support in honors biochemistry workshops to see how it affected student understanding and learning of complex material.

Hypothesis

- After completing the protein project independently, students will feel more confident using a software that has been scaffolded throughout workshops.

Method

- Optional pre- and post-surveys were administered. The pre-surveys were given during workshop, while the post-surveys were given during a lecture period due to scheduling difficulties. 45 out of 72 students participated in both the pre- and post-surveys. Survey questions were primarily qualitative and asked questions similar to those below:
  1. How confident are you with Jmol?
     - Extremely Confident, Confident, Neutral, Not Confident, Not Confident at all
  2. Which program did you use for viewing your protein?
     - JMOL, KING, PDB Ligand Explorer
  3. How much do you think lectures helped you in creating your video?
     - Very much, A little, Neutral, Not much, Not at all

Results

Section I: Change in Confidence Level with JMOL, PDB, and KING

Students who used their respective programs tended to gain a greater level of confidence in that program over those who did not use the program. The data from KING, which was not used by any students, serves as a control. This demonstrates that there is slight fluctuation between students with confidence level over time, regardless of program use.

Section II: Influences of Lecture, Workshop, and Question Sets on Confidence

The majority of students reported that lectures and workshops helped very much or helped a little, while most students felt that question sets did not help much or did not help at all.

Discussion & Conclusion

- Overall, the scaffolding techniques appeared to have had a positive influence on the students’ confidence level with protein-viewing software. As shown in Section I, students who used either JMOL or PDB in their protein project were more likely to have increased in confidence level with that respective program than students who did not use it.
  - However, as indicated by the KING control group and the JMOL and PDB Non-users, there is variation in responses over time regardless of which software was used.
- In general, students reported that lectures and workshops were helpful in making the protein videos while question sets were not.
  - However, the survey questions did not specify which aspects of lectures, workshops and question sets were being referred to. For example, it may have been more useful to ask for helpfulness of workshops, which introduced protein software.
  - Possible future studies:
    - Re-run the experiment with a control group that is not introduced to protein viewing software during workshops. This will allow us to see the full effect of scaffolding with instructor support.
    - How can scaffolding technology and computer software be used in other courses to aid in student learning?
    - Ex. Understanding mechanisms for a genetics course.

Bibliography


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