The effect of virtual lab delivery on motivation, learning, and academic success

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ABSTRACT

- Existing groups were recruited from semester 1 of the Fitness and Health Promotion program at Durham College (students in virtual lab delivery versus students in traditional in-person lab delivery).
- Students completed questionnaires at baseline (week 1) and following completion of the course (week 14).
- The effect of motivation and self regulated learning (SRL) was measured by the motivated strategies for learning questionnaire (MSLQ)
- The effects of self-directed learning (SDL) was measured by the self-directed learning readiness (SDLR) scale.
- MSLQ composite score (p = 0.009) as well as the MSLQ learning domain (p = 0.005) was significant with higher scores achieved by the virtual learning group.
- Trend towards higher academic grade for the in-person delivery group.
- Students who selected the virtual learning option possessed a greater capacity to self regulate their learning process using metacognitive and behavioral strategies.
- Certain predispositions make some students more likely to engage in SDL and may require different educational strategies.
- Implications for post-secondary education design.

INTRODUCTION

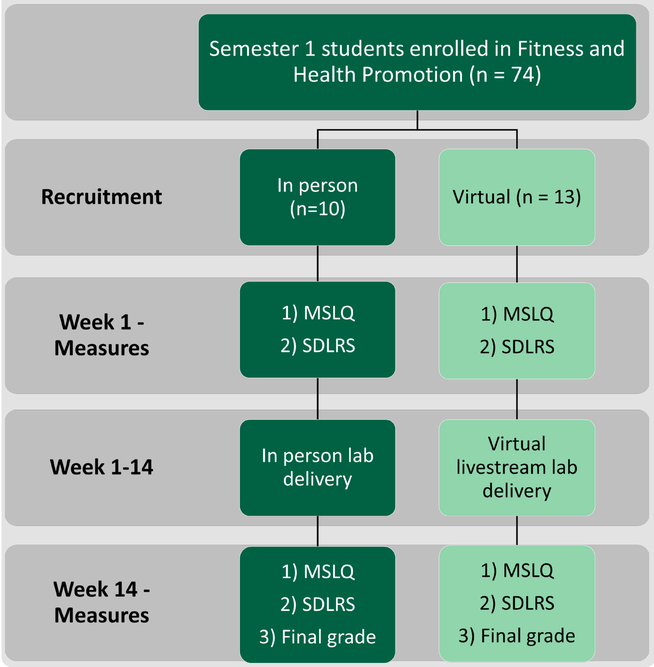
- Over the last decade, post-secondary institutions have increased the use of technology during curriculum development and implementation [1, 2].
- Accelerated in March 2020, when most post-secondary education had to shift to online delivery due to the COVID-19 pandemic.
- Advantages to online delivery: increased learner control, convenience, accessibility and reduced costs [3].
- Disadvantages to online delivery: increased disengagement and lower quality interactions between students and instructors [3].
- Current learning theories view students as active participants in the learning process [4] and this encompasses SDL, SRL, and motivation.
- Due to COVID-19 restrictions Durham College offered an alternative option (virtual lab delivery) for Fitness Assessment 1 in September 2021.
- Students were given an option to select their preferred lab option.
- Opportunity to investigate the differential effects of an online learning approach (virtual lab delivery) on motivation, SDL, SRL, academic success, and retention.

METHODS

- **Virtual lab group:** sections of 16 students and had their labs livestreamed from the lab to the students using Microsoft Teams.
- **In person lab group:** sections of 16 students and were put in small groups (2-3 students) to complete their lab assignments.
- To assess SDL, SRL and motivation the questionnaires were administered at week 1 and week 14.
- Academic success was measured by the final calculated grade in Fitness Assessment 1.

Figure 1: *Images of the virtual livestreaming equipment and fitness assessment lab*

Figure 2: *Schematic illustrating the study protocol indicating that MSLQ and SDLRS questionnaires are administered at week 1 and week 14*



RESULTS

PARTICIPANTS

- Virtual lab (n = 13) and in-person lab (n = 10) groups.

SDLRS

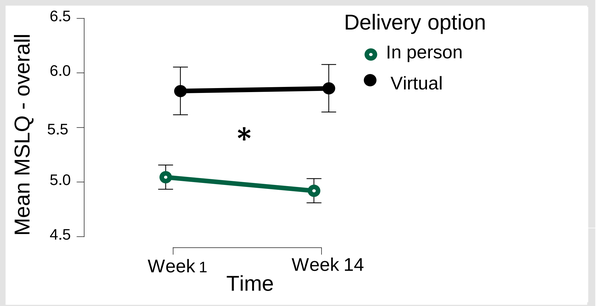
- Both groups scored >150
- No significant effect of Time or Time x Delivery. The main effect for delivery approached significance (p= 0.073)

Figure 3: *Line graph depicting the mean SDLRS measures at both time points for both groups. Error bars represent the standard deviation.*

MSLQ

- Significant main effect for delivery method (F (1, 15) = 9.069, p =0.009, ω2 = 0.20) with the virtual learning group achieving a higher score

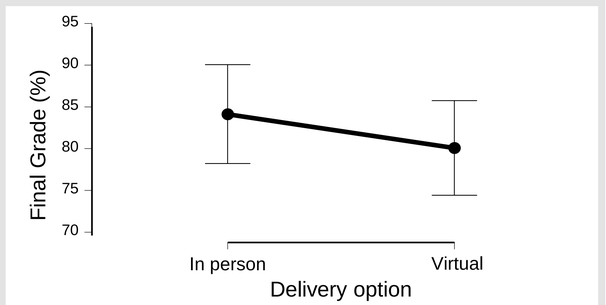
Figure 4: *Line graph illustrating the mean MSLQ measures (composite score) at both timepoints for both groups. Significant differences are indicated by an asterisk (p<0.05). Error bars represent the standard deviation.*



Academic grade

- Trend towards higher academic grade for the in-person group

Figure 5: *Line graph illustrating the mean final calculated academic grade for both groups. Error bars represent the standard deviation.*



DISCUSSION

SDLRS:

- All students had high SDLRS and therefore possessed the capacity to take initiative, diagnose their learning needs, formulate goals, choose appropriate learning strategies, and evaluate their learning.
- Virtual lab group achieved a higher score on the SDLRS at both timepoints and this approached significance.
- Students who decide to pursue post-secondary institution during the COVID-19 pandemic do so with an understanding that much of their learning will take place online and may therefore possess a high degree of SDLR.

MSLQ:

- In line with the trend of increased SDLRS measures for the virtual group, these students also had significantly higher MSLQ scores.
- Students who selected the virtual learning option possessed a greater capacity to self regulate their learning process using metacognitive and behavioral strategies.

Academic Grade/Learning

- Hypothesized that the increases in MSLQ and SDLRS measures for the virtual group at baseline enabled comparable academic success despite the online learning environment.
- The mandatory use of cameras and the use of breakout rooms helped the online students develop relationships, collaborate, and develop a sense of community.

Conclusion

- Differences in learning between the two cohorts of students.
- Students were able to self-select into the appropriate learning environment (online or in-person) allowing the students with higher levels of SDLR and MSLQ to select the online virtual learning option.
- Implications for post-secondary education design: certain predispositions may make some students more likely to engage in self directed learning and may require different educational strategies.

REFERENCES

1. Tan, S., F. Chuah, and H. Ting. Factors affecting university students' satisfaction on online learning system. in TARC International Conference On Learning & Teaching. 2016.
2. Wang, C.-H., D.M. Shannon, and M.E. Ross, Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. Distance Education, 2013. 34(3): p. 302-323.
3. Dumford, A.D. and A.L. Miller, Online learning in higher education: exploring advantages and disadvantages for engagement. Journal of Computing in Higher Education, 2018. 30(3): p. 452-465.
4. Smith, S.M. and C. Chen, MSLQ: Instrument validation of motivation and learning strategies for acquiring computer software application skills. Issues in Information Systems, 2015. 16(3).

Acknowledgements

The Authors would like to acknowledge the Centre for Teaching and Learning at Durham College for support and funding