Laidlaw Scholars Research Summary

Game On: Unlocking the power of gamified interprofessional education for knowledge co-construction (gIPE for KCC)

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1. Introduction

With the increasing complexity of medical research, and the growing awareness of mental and social health, interdisciplinary education in medicine has never been more important. Interprofessional education, as the name suggests, involves interactive learning between professionals in different fields (Thistlethwaite, 2012). This resonates with the idea of knowledge co-construction (KCC), especially in practical knowledge application (Parsons, 2021). KCC is a process where members of a group collaborate and learn from one another to expand their own understanding of a certain topic (Damşa & Ludvigsen, 2016). To enhance KCC, gamification has been studied as a method to promote learning, especially cooperative learning (Morschheuser et al., 2017), and involves the use of game design elements (Sailer, & Homner, 2020).

To effectively promote interprofessional education at The University of Hong Kong (IPE@HKU) through in-person and collaborative online international learning (COIL), gamified KCC will be studied as a novel way to enhance IPE in the field of medicine. Gamified KCC will exemplify the merits of both learning strategies – the enhanced engagement promoted in learning sessions, and the enthusiastic exchange of ideas. In line with the theme of interprofessional education, KCC will be promoted among professionals from various academic backgrounds, and game elements will be introduced to incentivize participant interaction. Guided by the Interaction Analysis Model, Participants will be sorted into an intervention (gamification) group and a control (non-gamified) group. Both groups will participate in an IPE (interprofessional education) Cancer Management simulation, and team interactions during the simulation will be recorded and transcribed to identify KCC processes.

Due to the nascency of gamified IPE for KCC in medical settings, this study aims to understand how KCC in interprofessional settings is facilitated by gamification among health professionals. It is hypothesized that the gamification will 1) significantly increase the level of interaction of professionals, 2) significantly increase the quality of KCC in IPE, and 3) modulate the relationship between teaching intervals and KCC through a moderate attenuation effect.

2. Methodology

2.1 Participants, Control and Randomization

This study is a 10-day experimenter-blind randomized control trial that will recruit 200 participants through multi-national and multi-site university recruitment ($1-\beta > .08$; Appendix 4). To increase the homogeneity of the sample, strict inclusion and exclusion criteria will be applied (Porzsolt et al., 2019). Under the inclusion criteria, all participants 1) must hold a bachelor's degree from a recognized university; 2) are of ages 21 or above; and 3) are physically present in Hong Kong at the time of the trail. The exclusion criteria apply when the participant 1) misses two or more sessions; 2) suffers from neurodegenerative disorders, learning disorders or other psychiatric disorders that may impair learning or social interaction. To prevent cross-over effects, participants cannot enroll in other education programs of a similar nature throughout the course of the trial.

Participants will be blindly assigned into non-gamified interprofessional education groups (control) or gamified KCC learning groups (experimental) through block randomization (Appendix 1; Appendix 2). Both groups will engage in interprofessional learning, the control

group will purely discuss and tackle tasks without gamification incentive, while the experimental group will partake in a “participation score” game. Participants are randomly selected into control or experimental groups in the adaptation learning task, while pre-assigned group pairs will be randomly selected into control and experimental groups for set intervention tasks. Grouping information can be retrieved after a ten-day activity and data collection period, experimenters will be blind to the nature of these groups until testing concludes (Appendix 1; Appendix 2).

2.2 Activities and Group Tasks

Testing will be conducted in two phases, the adaptive task FCC phase and the intervention task FCC phase. Both phases will be conducted online through a specifically designed application, which has a chat function and submission function. The adaptive task spans the first three days and consists of 40 groups of 5 randomly selected individuals who represent different academic majors. Each group is required to design and present a project on cancer management that encapsulates some concepts in areas that the group members major in. Control groups will specifically be told that no competition is involved, while gamification groups will be notified of a “Best Project” competition. The intervention task spans 7 days and will consist of pre-assigned groups that will deal with selected tasks (cases). Specifically, group members will be asked to provide suggestions on medical intervention or rehabilitation for cancer management, the gamification group will be notified of discussion activity competition, while control groups will not. At the end, all participants will be debriefed and will be given special gifts as a token of appreciation.

2.3 Data Collection and Analysis

After participant consent, data is collected at three major time points: qualitative measures after the adaptive task, cumulative interaction scores by day 3 of the intervention task, and cumulative interaction scores by day 7 of the intervention task. The primary outcome is quantitative interaction score data collected during the 7-day intervention task which integrates elements of the Scale for Assessing Academic Social Participation (SAASP) in university students (Sánchez-Rosas, 2017), while the secondary outcomes are concept mapping test scores in the intervention task (Hay et al., 2008) and the creativity and effort scores given to group projects in the adaptive task. The interaction scores will be based on chatroom interactions, while the adaptive task scores and concept mapping scores will depend on group and individual submissions.

The interaction scores will be collected online and will account for overall interaction, with ratios adjusted for questions (academic help-seeking) and question replies (KCC). Concept mapping will involve an individual test at the end of the intervention task. Each participant will map everything they understand about a given topic on a notepad. Nodes of concepts related to the discipline of other teammates will be given higher scores, while the overall bulk of demonstrated knowledge will be considered less. Finally, the creativity and time spent on planning out the adaptive task project will also be noted, providing a qualitative measure of engagement and learning in gamified KCC.

Differences in interaction scores and average adaptive task scores between treatment groups across time points will be analysed by mixed ANOVA and an independent samples t-test respectively, this concerns the overall adjusted interaction scores between groups across 7 days, as well as the novelty and effort made in completing the adaptive task (Appendix 3). To

interpret ANOVA results, post-hoc tests with Bonferroni corrections would determine whether significant differences are observed between groups across time points ($p_{Bonferroni} < .05$). Finally, the moderating effect of gamification on the relationship between teaching intervals and KCC and will also be explored through moderation analysis (Appendix 3).

3 Discussion

This project aims to study the efficacy of gamified KCC in promoting interprofessional knowledge exchange and application. To our knowledge, this is the only multi-national study gamification and interprofessional KCC, demonstrating the importance of this study in paving the way for new cross-department knowledge exchange protocols in medicine. While we acknowledge that our short period of investigation may limit our ability to accurately and distinctly identify long-term benefits of KCC, and that personality traits such as introversion may influence the degree of individual participation (Murphy et al., 2017), we hope to make up for that by increasing sampling intensity within the 7 days, and by recruiting a sufficiently large and diverse group of participants randomized into control and experimental groups. In short, we hope to uncover synergistic education tactics through the use of gamification and KCC, providing a novel method of interprofessional education in the field of medicine.

4. Proposed Timeline

2024

June: Complete systematic review on the topic (3000-word research essay) and modify study design

July: Create a research poster and start planning and writing the research paper

September: Poster presentation, submission of research essay

October: Data collection

November: Data analysis, writing and editing the research paper

December: Writing and editing the research paper

2025

January: Final editing of the research paper manuscript, journal submission (for peer review)

References

Damşa, C. I., & Ludvigsen, S. (2016). Learning through interaction and co-construction of knowledge objects in teacher education. Learning, culture and social interaction, 11, 1-18. https://doi.org/10.1016/j.lcsi.2016.03.001

Hay, D. B., Wells, H., & Kinchin, I. M. (2008). Quantitative and qualitative measures of student learning at university level. *Higher Education*, *56*, 221-239. https://doi.org/10.1007/s10734-007-9099-8

Morschheuser, B., Maedche, A., & Walter, D. (2017). Designing cooperative gamification: Conceptualization and prototypical implementation. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing* (pp. 2410-2421). https://doi.org/10.1145/2998181.2998272

Murphy, L., Eduljee, N. B., Croteau, K., & Parkman, S. (2017). Extraversion and introversion personality type and preferred teaching and classroom participation: A pilot study. *Journal of Psychosocial Research*, *12*(2), 437-450. https://www.researchgate.net/profile/Laurie-Murphy-4/publication/324503633_Extraversion_and_Introversion_Personality_Type_and_Preferred_Teaching_and_Classroom_Participation_A_Pilot_Study/links/5ae8974c0f7e9b837d3aea66/Extraversion-and-Introversion-Personality-Type-and-Preferred-Teaching-and-Classroom-Participation-A-Pilot-Study.pdf

Parsons, S. (2021). The importance of collaboration for knowledge co-construction in 'close-to-practice'research. *British Educational Research Journal*, *47*(6), 1490-1499. https://doi.org/10.1002/berj.3714

Porzsolt, F., Wiedemann, F., Becker, S. I., & Rhoads, C. J. (2019). Inclusion and exclusion criteria and the problem of describing homogeneity of study populations in clinical trials. *BMJ evidence-based medicine*, *24*(3), 92-94. https://doi.org/10.1136/bmjebm-2018-111115

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, *32*(1), 77-112. https://doi.org/10.1007/s10648-019-09498-w

Sánchez-Rosas, J., Molinari, A. V., Takaya, P. B., & Domínguez-Romero, N. C. (2017). A scale assessing social academic participation in class for university students. *Psycho-Educational Research Reviews*, *6*(1), 36-50. https://perrjournal.com/index.php/perrjournal/article/view/284

Thistlethwaite, J. (2012). Interprofessional education: a review of context, learning and the research agenda. *Medical education*, *46*(1), 58-70. https://asmepublications.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1365-2923.2011.04143.x?casa_token=Ykcktmf3XxsAAAAA%3AInxsABvlsMkiWIcj7V4hVxuVljVlvH8fLwlFwExH7VZZGUaSQzkCOrR8MmQuwGDFCG6dDH7gpIJuubgq

*The Appendix basically consists of a bunch of python code, contact me if you are interested. This is a short version of my proposal and I had to, as expected, shorten each section and cut the power analysis, and the calculations for the expected results. Enjoy!