


A Pilot Project Exploring Low-tech Collaborative Board Gaming on Student Attitudes Toward Interprofessional Education

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Objectives: Exploring the impact of a small, collaborative gaming experience among undergraduate students on student attitudes and beliefs about Interprofessional Education (IPE).

Methods: Health sciences librarians at two state universities used a low-tech, collaborative board game to facilitate small, in-person group gaming. The authors used an adapted version of the Interprofessional Attitudes Scale (IPAS), a validated instrument that measures the four domains of the 2011 IPEC Core Competencies for Interprofessional Collaborative Practice, as a pre-/post-assessment of the impact of the gaming experience.

Results: While anecdotal evidence indicated that playing a collaborative board game had an impact on the participating students, there was no statistical evidence that collaborative board games increase positive or negative attitudes about IPE and interprofessional collaborative practice.

Conclusions: More student participation is required for statistical significance. Recruiting students and ensuring that students have enough time to complete the game play is key to possible future success.

Introduction

Interprofessional Education in Health Sciences Curriculum

Interprofessional education (IPE) is a growing trend among health sciences curriculums that integrates students from multiple disciplines into teams for collaborative problem solving. The World Health Organization¹ reports that IPE builds collaborative skills and knowledge for future practitioners to tackle global health challenges in order to improve health outcomes around the world. An effective IPE curriculum may also impact students by increasing positive attitudes², and lead to an increase in collaborative behavior and patient satisfaction³. Understanding each individual's professional role and expertise and developing respect and trust through clear communication are critical to effective IPE⁴.

Elements that contribute to effective IPE include maintaining open dialogue, shifting

from an egocentric to a collaborative mind-set, developing mutual trust, and establishing mutual goals, all of which contribute to higher levels of team satisfaction⁴. However, a systematic review⁵ identified a list of barriers to implementing IPE including stereotyping among faculty and students involved in the IPE program and varying characteristics of students from different backgrounds. The authors note that hierarchies exist among health sciences professionals, with faculty members and students in medicine typically at the top. These hierarchies enable faculty behaviors to be guided by certain attitudes. Students tend to mimic and adopt those faculty attitudes, thus making collaborative learning and establishing mutual respect challenging⁵. Positive attitudes, on the other hand, are valuable for facilitating an effective IPE curriculum^{5,6} through open-mindedness and enthusiasm for participation. Sunguya et al.⁵ further suggest benefits to preparing IPE students in advance with the acknowledgement that participating students and faculty have different learning needs and approaches to care. Additionally, faculty involvement in IPE may also contribute to the success or failure of IPE programs. Sunguya et al.⁵ state that faculty level of preparedness, attitudes and biases, and ability to manage a class impact a student's experience of the IPE curriculum. Giordano, Umland, and Lyons⁶ and Gary, Gosselin, and Bentley⁷ note the importance of positive faculty engagement and support for students to the success of the IPE curriculum.

Games as a tool for collaborative learning

A systematic review investigating the use of escape rooms in education noted that the game strengthened relationships by creating a sense of belonging among the players, improving creative problem-solving skills, fostering collaborative leadership behaviors, and motivation⁸. Similarly, another study⁹ noted the positive impact of an escape room-type game in increasing IPE behavior and communication among students. However, Fotaris and Mastoras⁸ note that creating an escape room activity is time-consuming and may be limited due to lack of time commitment and limited resources.

Board games, on the other hand, have been used to increase empathy and collaborative attitudes¹⁰⁻¹², and enhance learning and knowledge^{12,13}. Using a preexisting board game reduces the time commitment needed to design a game from scratch and is relatively inexpensive and accessible in comparison to escape rooms. The tactile aspect of board gaming and other low-tech gaming options can encourage collaborative student engagement and learning in library settings^{14,15}. Modern tabletop games also have systems of rules that help students learn about their own abilities with no fear of embarrassment, and students can transfer important skills learned during the gaming period to their academic experience^{16,17}. Libraries are offering more opportunities for gaming with their users, and more librarians are offering games as a means of engaging and teaching important skills to their users.

Research question

This research aimed to explore the use of collaborative, low-tech board gaming on student attitudes and beliefs about Interprofessional Education using an adapted version of the Interprofessional Attitudes Scale (IPAS), a validated scale created by Norris et al.¹⁸. The IPAS was selected as a pre- /post-measurement for this research study. Validation results for the IPAS indicate that the scale has good factor structure

and internal consistency¹⁸. The IPAS was used with permission from Norris et al., and modified, with permission, to better represent the degrees and programs available at the universities in this study. The IPAS measures the four domains of the 2011 IPEC Core Competencies for Interprofessional Collaborative Practice¹⁹ including the Values and Ethics for Interprofessional Practice, Roles and Responsibilities, Interprofessional Communication, and Team and Teamwork. What was particularly attractive to the authors about the IPAS was that the tool measured, among other things, individual students' agreement with statements about teamwork roles and responsibilities, which aligned with the authors' interest in collaboration amongst students. The IPAS uses Likert scale questions to record students' agreement with statements regarding teamwork roles and responsibilities, patient-centered care, unprofessional biases, diversity and ethics, and community-centeredness.

By utilizing IPAS, the authors attempted to determine if playing a collaborative board game, that puts players into various assigned public health professional roles to prevent a worldwide pandemic, increases positive self-reported student attitudes and beliefs about interprofessional education and interprofessional collaborative practice. Giordano, Umland, and Lyons⁶ and Gary, Gosselin, and Bentley⁷ recommend an initial assessment of attitudes towards IPE for developing an effective curriculum and call for a reevaluation of those attitudes throughout the program. IPE requires students to work together while respecting the individual roles, skills, and experiences of each student. The authors have experience with IPE in nonclinical settings and intended to leverage that experience to explore if a collaborative board game encourages the practical requirements of IPE, such as working together while respecting individual roles, skills, and the experiences of the participating students. The author at Sacramento State University has been part of a faculty learning community focused on IPE and runs an IPE book club with a nonlibrary faculty member focused on aging. The IPE book club offers an IPE certificate for participation through the Interprofessional Education Center for Innovative Teaching and Learning. The IPE program at University of New Hampshire is a small, but growing initiative. The author at University of New Hampshire works with students and faculty who are involved in the support and participation in the IPE program. With these experiences and with the authors' experiences playing the board game, it was possible for the game to serve as an option for students who might not have a chance to participate in IPE opportunities otherwise.

Methods

Background and Settings

Participants were recruited from two large state universities, one on the West Coast and one on the East Coast: Sacramento State University in California and the University of New Hampshire in New Hampshire. Sacramento State University is located in a large urban area and is a majority commuter campus with approximately 28,000 students at the time this research was conducted. It offers undergraduate and graduate degrees in various allied health disciplines, including but not limited to Nursing (undergraduate and graduate degrees), Physical Therapy (graduate degree), Communication Sciences Disorders (undergraduate and graduate degrees), and Gerontology (undergraduate and graduate certificates). Sacramento State University is

a Hispanic-Serving Institution and an Asian-American, and Native American Pacific Islander-Serving Institution. The University of New Hampshire is a rural campus and the flagship institution of the state of New Hampshire. The University of New Hampshire campus had approximately 12,000 students at the time this research was conducted, offered undergraduate and graduate degrees in various allied health disciplines, including but not limited to Nursing, Communication Sciences and Disorders, Occupational Therapy, and Health Management and Policy.

Background

The study was active from January 2018 - April 2019. The authors initially intended to recruit student participants who were involved in Interprofessional Education curriculums, but due to very limited enrollment, broadened the study to include students in the College of Health and Human Services, and eventually to any student enrolled at Sacramento State University. Pre- and post-assessment IPAS surveys were printed out for students for each session and provided before and after game play. A total of ten students participated in the study and completed the pre- and post-assessments. The authors held a total of six in-person gaming sessions in which participants played a collaborative board game titled, *Pandemic*. At Sacramento State University only three sessions had students: one large group of seven students, and two small groups. In the large group, only six students completed the IPAS and played the entire time. One small group had three students, but only two completed the IPAS and the other small group had two students, but only a single student completed the IPAS and was interested in playing the game. At University of New Hampshire, only one session had one student who completed the IPAS.

Pandemic was chosen because it is a collaborative board game with a health sciences emphasis. In the game, each participant is assigned a specific role based on real-life health sciences professions and disciplines, and the players must work cooperatively with other players to eradicate and treat four different diseases before any one of the diseases becomes a pandemic. Players randomly select a role card, which describes what the player can do in addition to the normal parts of play in the game. Each role has a different special function, and some roles are more helpful for different strategies than others. For example, when playing as the Dispatcher, you can move players around the board easier and faster than players moving on their own, or, when playing as the Researcher, you can give your research (cards that players must collect in a matched set to start eradicating a specific disease) to other players or move research from player to player. While these roles are very simplified, they offer insight into the various roles that people occupy in a real health care team. Each session consisted of one to six study participants and lasted approximately 30 to 90 minutes. The authors booked private library spaces to hold the study, with the understanding that the library is space that is shared by all of the various departments and no single program or discipline has a claim on the space used. In some instances, the authors participated in the game play, particularly when there was only one study participant. However, the author at Sacramento State University participated with group game play when requested to do so by the students and served as a moderator when requested with the larger group of students. A moderator is someone who doesn't need to play the game, but can read the rules to the participants, particularly when the game play stalls due to different interpretations of the rules. The authors did not have a formal

measurement that recorded whether students had previously played the game.

IRB

This research study was submitted to and approved by the Institutional Review Board at Sacramento State University on January 24, 2018, IRB-17-18-105, and a collaborative research agreement was signed between the institutions.

Marketing

To encourage students to participate in the research project, fliers were created using the Piktochart web tool and distributed at both campuses. At Sacramento State University, fliers and information were sent to faculty members in the health sciences programs, as well as distributed to the Interprofessional Education student organization and the Gaming Club for students. Similarly, at University of New Hampshire, fliers were shared with faculty members in the health sciences programs to email to students, presented at the end of library instruction sessions, and physically displayed in bulletins. Students were offered snacks as part of the experience, which were provided by the researcher from Sacramento State University, and pizza provided by the researcher at University of New Hampshire.

Results

A total of ten students from both institutions completed both the pre- and post-IPAS assessments. Most students had science or health sciences backgrounds but did not have previous experience with IPE. Student majors included Biology, Chemistry, Engineering, Recreation Therapy, and Gerontology. Only two students who completed pre- /post-IPAS assessments indicated previous experience with IPE, but that previous experience did not seem to have a strong impact on their scores on the IPAS. Each participant was asked to fill out hard copy pre- and post-IPAS assessments and one author documented the de-identified data into an institutional Qualtrics survey software. The 26th version of the SPSS statistical software was used to run multiple ANOVA and t-tests. Findings are presented below in Table 1 and Table 2.

Table 1. Paired Sample Statistics

Pair	Mean	Std. Deviation	Std. Error Mean
Teamwork Pre	53.40	4.169	1.318
Teamwork Post	54.20	4.709	1.489
Patient-Centered Pre	33.70	1.829	.578
Patient-Centered Post	34.30	.949	.300
Biases Pre	13.60	1.838	.581
Biases Post	15.40	3.406	1.077
Diversity Ethics Pre	27.10	1.287	.407
Diversity Ethics Post	26.90	1.912	.605
Community Pre	38.30	2.627	.831
Community Post	39.20	3.425	1.083
Additional Pre	80.10	6.045	1.912
Additional Post	84.00	7.196	2.275
All Pre	246.20	9.773	3.090
All Post	254.00	9.262	2.929

Table 2. Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df	Sig. (2-tailed)
Teamwork	-.800	5.750	1.818	-4.914	3.314	-.440	9	.670
Patient-Centeredness	-.600	1.897	.600	-1.957	.757	-1.000	9	.343
Biases	-1.800	4.662	1.474	-5.135	1.535	-1.221	9	.253
Diversity and Ethics	.200	2.150	.680	-1.338	1.738	.294	9	.775
Community	-.900	2.998	.948	-3.045	1.245	-.949	9	.367
Additional	-3.900	7.965	2.519	-9.597	1.797	-1.548	9	.156
All	-7.800	10.064	3.183	-15.000	-.600	-2.451	9	.037

Results from the pre- and post-IPAS assessments suggest that playing a collaborative board game had a modest impact on student attitudes towards Interprofessional Education. For all items of the IPAS, with the exception of the Diversity and Ethics item, post-assessments had slightly higher scores in comparison to pre-assessments. It is difficult to interpret what these modest shifts in pre- and post-assessment scores

might mean without examining each item's subscale. For example, the Teamwork, Roles, and Responsibilities subscale includes disparate items such as "Shared learning will help me think positively about other professionals," "Patients would ultimately benefit if health sciences students worked together to solve patient problems," as well as "It is not necessary for health sciences students to learn together." Thus, without examining each subscale, a higher post-assessment score would not necessarily suggest an overall more positive attitude toward teamwork. Subscale analysis for the data is not included in this work due to the small sample size. For the subscales to be useful in understanding the effects of the intervention, a larger sample size is needed.

For Interprofessional Biases, subscale items include "Health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying," "I have prejudices or make assumptions about health professionals/students from other disciplines," and "Prejudices and assumptions about health professionals from other disciplines get in the way of delivery of health care." Similarly, this item is challenging to decipher without examining each subscale item. Though study participants scored higher in the post-assessment, some students only interacted with one of the authors during game play rather than with other students, limiting the possible validity of the results presented

On the other hand, the Patient-Centeredness, Diversity and Ethics, and Community-Centeredness scales include subscale items that were more analogous and would indicate that higher post-assessment scores equate to improved attitudes towards IPE after game play. That said, the Diversity and Ethics scale was the only scale that had a modest decrease in post-assessment scores in comparison to the pre-assessment scores.

Due to the small number of participants, there is no statistical significance to the results of the IPAS assessment. However, anecdotal comments from participants indicated that playing the board game with students from other majors was an experience that helped them discover their own biases and was a lesson in teamwork. For example, at Sacramento State University, the six students who participated in the largest group of players, often had difficulty agreeing on actions and working together. The biology students with a confirmed health sciences interest commented to the author that they had not worked with students from some of the other majors before and that it was a learning experience about how different people approach problems. Another student from a different session than the one previously described, commented that it was sometimes frustrating to play the game when they had to depend on other players who interpreted things differently. While this is anecdotal, these comments indicate that the experience of playing the collaborative board game did cause students to consider key areas of IPE that are measured by the IPAS, particularly teamwork roles and responsibilities and interprofessional biases.

Lessons Learned

While there is little statistical impact in the current study and not all students completed the IPAS assessment or chose to share comments, the comments they did receive lead the authors of this paper to postulate that with more participants there

could be significant data collected. Furthermore, for universities where IPE opportunities are limited for undergraduate students, offering a collaborative health sciences-focused board game experience can be a cost-saving opportunity for low-risk IPE. IPE educational opportunities ideally allow students to learn how to work with other students with different backgrounds and experiences with a goal that is reflective of a health care focus^{1,2}. Playing a board game with a health care focus, such as working as a team where each member has specific skills and different roles to prevent a pandemic, allows students to have access to an IPE-style experience without having to wait to be enrolled in the higher-level courses that are often where students encounter IPE.

The authors note that another significant limitation to this study is the small participant size and possible self-selection. Challenges with marketing and student time and interest contributed to the small participant pool size. The few students who participated may have had some familiarity with board gaming and enjoyed collaborative games prior to playing *Pandemic*. It is possible that offering the gaming sessions in a dedicated space specifically for health sciences students to converge, such as a health sciences lounge or at a health sciences library, might assist future research with recruitment. Alternatively, offering gaming sessions as part of student orientations for IPE programs could potentially contribute to increased engagement. Having to travel to different areas of campus, which might be far from health sciences classrooms, was a deterrent for participation. Students were sometimes reluctant to complete the pre-/post-IPAS and this did limit the number of results. Being able to offer incentives for the completion of the IPAS probably would have increased participant completion rates. The IPAS would also benefit from collecting more specific demographic data, and in future research utilizing the IPAS, it would be very helpful for the IPAS to be modified to reflect this need.

Many of the IPE opportunities at the participating universities are only open to students enrolled in higher-level health sciences programs. The authors hoped that by opening the gaming IPE experience to students in nonhealth sciences focused programs, they could increase participation in the study, and more students would be able to experience IPE for the first time. The authors felt that by being more open and inclusive of students in nonhealth sciences departments, this IPE experience would also be more reflective of the Interprofessional Practice (IPP) experience. IPP is often a clinical experience and IPE is designed to help prepare students to enter clinical settings where IPP is an expected experience, however in many settings, IPP includes professionals such as social workers, advocates, and religious counsellors, who are not well-represented in IPE experiences in the published literature. The authors hope that future IPE experiences will be more inclusive to the students who will take on these roles and that future research will find a way to record if IPE with students outside health sciences disciplines is helpful for professional development.

This research was conducted before the COVID-19 pandemic, and the authors recognize that it might be difficult to replicate this research during a pandemic as in-person gathering and playing board games are not recommended at the time of the writing of this paper. There is an application-based mobile version of the game that could be utilized. However, without the in-person interaction, it would be difficult to

determine if the IPE interaction occurred utilizing measurements based on in-person IPE interventions. It is also important to acknowledge that a version of the game that requires the use of mobile devices is an equity issue, particularly for students who customarily utilize campus-provided devices, as not all campuses provide mobile devices to all students, internet access can be an issue, and it might not be permissible for students to download and use the application-based version of the game on a campus-provided device.

It is also worth noting that playing a game about preventing a pandemic while simultaneously experiencing a real-life pandemic might not be the most appropriate choice, so other collaborative board games should be explored as an option. The authors recognize that playing a game about preventing a pandemic before experiencing a pandemic in real life might affect participants who have played the game, such as increased understanding of the importance of collaboration from professionals around the world, and hope that future research will explore these and other concepts as appropriate and with all due consideration to the well-being of the participants.

Conclusion

Gamification and IPE are two unique services that libraries can offer their institutions. Using a popular board game provides an opportunity to engage students in health sciences-related majors who are interested in games but might not otherwise be interested in participating in IPE opportunities. This may be particularly important for students who choose to work in health-focused fields, such as health advocacy, medical engineering, recreational therapy, and health care administration. These student groups are generally overlooked in traditional IPE activities but may benefit from IPE since they will most likely work with traditional health sciences practitioners in their future career paths. It is also important to note that using a relatively low-cost game, which does not require special technology or access to the internet to use, ensures that students and institutions with different levels of access to technology and with different budgets have an opportunity to offer a low-stress IPE experience for students.

While there are many examples of successful gamification and of IPE in libraries, we understand that our research does not represent success, but rather an opportunity for future research.

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Declaration of Interest: None to report

Contributions:

Rachel Keiko Stark facilitated a request for a collaborative IRB. Both authors marketed and conducted the research studies at each of their institutions and gathered formal IPAS responses. Rachel Keiko Stark entered all pre- and post-IPAS assessment responses into Qualtrics while Eugenia Opuda ran the responses through the SPSS software and ran paired sample statistics. Nina Exner was consulted on interpreting the data obtained through SPSS and the authors thank and appreciate her assistance. Rachel Keiko Stark also gathered informal participant comments. Both authors contributed to writing and editing the manuscript.

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