HIP&E

An Exploratory Investigation of Longitudinal Inter-professional Education Attitudes at the Team Level

RESEARCH BRIEF

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ABSTRACT

Introduction: Although interprofessional education (IPE) experiences inherently include students from different academic programs working together, most quantitative IPE longitudinal research is analyzed at the all-student level or academic program level. There is a need to assess IPE outcomes at the team level.

Methods: Pre-licensure students participating in a two-year IPE curriculum were randomly assigned to 60 teams. Each student completed the Student Perceptions of Interprofessional Clinical Education Revised instrument, version 2 (SPICE-R2) using a retrospective pre/post-test design at the end of the first and second year. Boxplots of score changes for each of the teams were constructed. Differences in SPICE-R2 score changes over time (Year 1 to Year 2) across teams were examined using a two-way repeated measures ANOVA to understand potential interactions between the factors of team and time.

Results: Positive, negative, and neutral changes in team boxplot dispersion scores were noted. A two-way repeated measure ANOVA found a significant interaction of team and time for SPICE-R2 score changes (p-value = 0.041), which indicated score changes from Year 1 to Year 2 were dependent on individual student teams.

Discussion: Additional research is needed at the team level, as the goal of IPE is to develop learners to practice collaboratively on teams. Well-designed research using theory and/or frameworks and respective assessments are needed to advance the research in this area.

IMPLICATIONS FOR PRACTICE

- There is a need to explore the impact of IPE interventions at the team level.
- Further research studying the bases of attitudes is needed to determine impact on IPE attitudes and behaviors.
- Identifying specific theories and/or frameworks in the development of IPE activities can identify effective interventions to support positive attitudes needed for collaborative practice.

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INTRODUCTION

Collaborative practice, learning how to work on a team, is a desired outcome of interprofessional education (IPE) (World Health Organization, 2010). However, there is a deficiency of team-related research in the IPE literature. Although IPE experiences inherently include students from different academic programs working together in groups or teams, most quantitative IPE longitudinal research is analyzed at the all-student level or academic program level (Zomorodi et al., 2017; Davila et al., 2021; Brown et al., 2016; Miselis et al., 2022). The purpose of this study was to explore attitude outcomes at the team-level for pre-licensure students engaged in a longitudinal IPE curriculum.

After database searches in Medline and CINAHL, and handsearching journals in the IPE field, a few IPE simulation articles were found evaluating team outcomes (Ganotice et al., 2022; Brown & Benson, 2020; Lau et al., 2019; Shrader et al., 2013). None of those studies measured team outcomes after engagement in a longitudinal curriculum or course. Therefore, the research focus was exploratory to investigate team-level outcomes using an attitudinal survey after engaging in a longitudinal curriculum. The primary research question was "What is the impact of a two-year longitudinal curriculum on IPE attitudes at the team level?" While not a secondary research question, the author team analyzed IPE attitudes at the all-student level for comparison and discussion purposes.

METHODS

Pre-licensure students engaged in the Team Up Compassion, Collaboration, Communication® (known as TEAM UP™) curriculum during the 2020–21 and 2021–22 academic years (known as Cohort 2020) were randomly assigned to 60 teams. Teams included 8–13 members, with an average size of 10.55. Team members were enrolled in undergraduate and graduate programs. Undergraduate programs included cardiovascular sonography (10), medical laboratory science (21), dental hygiene (37), undergraduate nursing (161), and respiratory therapy (8). Graduate programs included audiology (11), dentistry (76), medicine (187), occupational therapy (35), physical therapy (30), physician associate (35), and speech-language pathology (22).

TEAM UP™ Cohort 2022 students remained on the same team for the two-year period. Student teams met synchronously and virtually three times during the fall semester and three times in the spring semester, each academic year for a total of 6 sessions. During Year 1, sessions were 60 minutes in length and in Year 2, sessions were 50 minutes in length. The focus of Year 1 was for students to build their interprofessional team, developing effective communication and collaboration skills. In addition to case-based activities focused on infection control, immunizations and aphasia, first-year students applied their teamwork skills through the Health Partner Project. Each student team engaged with an individual in the community to learn about the Health Partner's healthcare lived experiences and their health goals. Through active listening and communicating across all team members, students provided a community resource list to the Health Partner. The resource list is related to opportunities the Health Partner may consider as they work towards reaching health goals. Year 2 provided second-year students with the opportunity to enhance their knowledge about professional roles while applying collaborative skills through case-based learning. Cases covered a wide spectrum of patient/client conditions with a focus of primary and secondary prevention. The culminating project was the development of an interprofessional primary or secondary annual wellness visit specific to an age or medical condition.

Louisiana State University Health Sciences Center in New Orleans requires health professional students to engage in IPE through a two-year longitudinal curriculum known as TEAM UP™. One of the measures used to evaluate curriculum outcomes is the Student Perceptions of Interprofessional Clinical Education Revised instrument, version 2 (SPICE-R2), a validated attitudinal survey (Zorek, 2017). Completion of the SPICE-R2 was a required assignment of the curriculum. After the last/sixth session, each student was provided a week to complete the SPICE-R2. The SPICE-R2 was housed in the institution's electronic learning management platform. The learning platform provided the opportunity to organize students into a group function. For example, all students on Team #1 are assigned to Group 1. The platform also supported the export of SPICE-R2 responses by student and group number. After the export, students were assigned a new identifier number before all other identifiers were removed, and data was analyzed. A total of 712 students completed the SPICE-R2 after Year 1 and a total of 644 students completed the SPICE-R2 after Year 2. Students who completed the SPICE-R2 were included in the analysis (IRB #10106).

The SPICE-R2 has strong psychometric properties for construct validity and reliability (Lockeman et al., 2017; Zorek et al., 2017). Cronbach's alpha for overall reliability was 0.85 (Zorek et al., 2017). One decision to use the SPICE-R2 for this specific study was related to its use over the past six years in the curriculum. While this initial study is presented as a Research Brief, future comparative analyses of the various student cohorts can provide further insight on

curricula design and its impact on IPE attitudes at the team level. Additionally, since perceptions can impact behaviors (Fishbein & Ajzen, 1975), positive or negative perceptions at the team level can translate to respective future team behaviors. With the goal of IPE focused on developing collaborative practice-ready health professionals, team attitudes developed during IPE training have the potential to impact health outcomes.

ANALYSIS

Students completed the SPICE-R2 using a retrospective pre/post-test design (RPP) at the end of the first and second year. The use of a traditional pre-/post-test design (TPP) is limited by response shift bias (Howard et al., 1979). A RPP design eliminates response shift bias. Students were provided a questionnaire at a single point post-curriculum and asked to reflect on a time point before the experience, thus keeping the frame of reference constant (Howard, 1980).

The SPICE-R2 includes 10 statements and uses a 5-point Likert scale (Zorek et al., 2017). SPICE-R2 total score changes (post-score minus retrospective pre-score) after engaging both 1 year and 2 years of the curriculum were calculated for each student in 60 teams of the Cohort 2020. After pairing students from Year 1 and Year 2 and cleaning for missing data, a total of 633 students scores were analyzed.

We first explored the change in SPICE-R2 total scores across teams after Year 1 and Year 2 of the curriculum using boxplots and then used analysis of variance (ANOVA) to measure the statistical significance of the findings. Boxplots of score changes for each of the 60 teams were constructed. Teamwise boxplots provided visualization and insightful information regarding the distribution (shape, variability, and center) of score changes within a team for a given year. Outliers in the boxplot figure were removed as the focus was on the team, not individuals. Most of the boxplots were not highly skewed with significant outliers. For post-Year 1, 16 teams had outliers (1–2 individuals), and for post-Year 2, 14 teams had outliers (1–3 individuals). The boxplots were summarized by calculating the percent of teams exhibiting increase, decrease or no change in the median (second quartile: Q2) score change and interquartile range (IQR) change from post-Year 1 to post-Year 2. An increase in the median implies improvement in IPE attitudes among students of a team from post-Year 1 to post-Year 2. The IQR measures the variability in the score changes within a team. A decrease in IQR from Year 1 to Year 2 would imply a more similar IPE attitudes among students of a team, while an increase would indicate the opposite.

Differences in SPICE-R2 score changes over time (Year 1 to Year 2) across teams were examined using a two-way repeated measures ANOVA ($p < 0.05$) to understand potential interactions between the factors of team and time. The response variable was the score change and the explanatory variables were time (Year 1, Year 2) and team (team 1 to team 60) as well as the interaction of time and team.

At the all-student-level pre- and post-means were calculated, significance of mean change scores were calculated using the paired t-test ($p < 0.05$), and Cohen's d was calculated to determine effect sizes. Analyses were conducted using statistical software R (version 4.2.2).

RESULTS

Boxplots were one representation of team-level analysis. Figure 1 provides boxplots for all 60 teams (post-Year 1 and 2, respectively) for the SPICE-R2 total score change. Another opportunity to observe team-level changes are included in Figure 2. The data in Figure 2 represents a proportion of the teams that have an increase, decrease, or no change in quartile 2 (Q2)/median and IQR from Year 1 to Year 2.

Positive, negative, and neutral changes in the minimum score, maximum score, Q2, and IQR were noted. 44 teams had a negative minimum score change post-Year 1 with a range from −36 to −1, and 40 teams had a negative minimum score post-year 2 with a range of −35 to −1. The range for the maximum score change post-Year 1 was 6 to 28, and post-Year 2, 10 to 24. Three teams (Teams 3, 6, and 52) and 2 teams (Teams 14 and 50) had 100% of their team members with a minimum score change post-Year 1 and post-Year 2, respectively, greater than zero.

A two-way repeated measure ANOVA found significance ($p < 0.05$) for time ($p = 0.019$) and the interaction of team and time ($p = 0.04$) on SPICE-R2 score changes. So, the overall mean total score improvements after Year 1 and after Year 2 (5.28 vs. 5.88, respectively) were observed to be significantly different, and score changes from Year 1 to Year 2 were significantly influenced at the individual student team level. In contrast, significance was not found for the main factor of team ($p = 0.220$), which indicates the overall mean score changes across all teams (without considering years in the IPE program) were not significantly different. Table 1 provides descriptive statistics at the all-student level.

DISCUSSION

This study discovered two new findings. The first was the discovery of a team × time interaction on SPICE-R2 total score changes. This was true despite not observing a main effect of team on SPICE-R2 scores, indicating that IPE attitude changes were roughly similar across all teams in

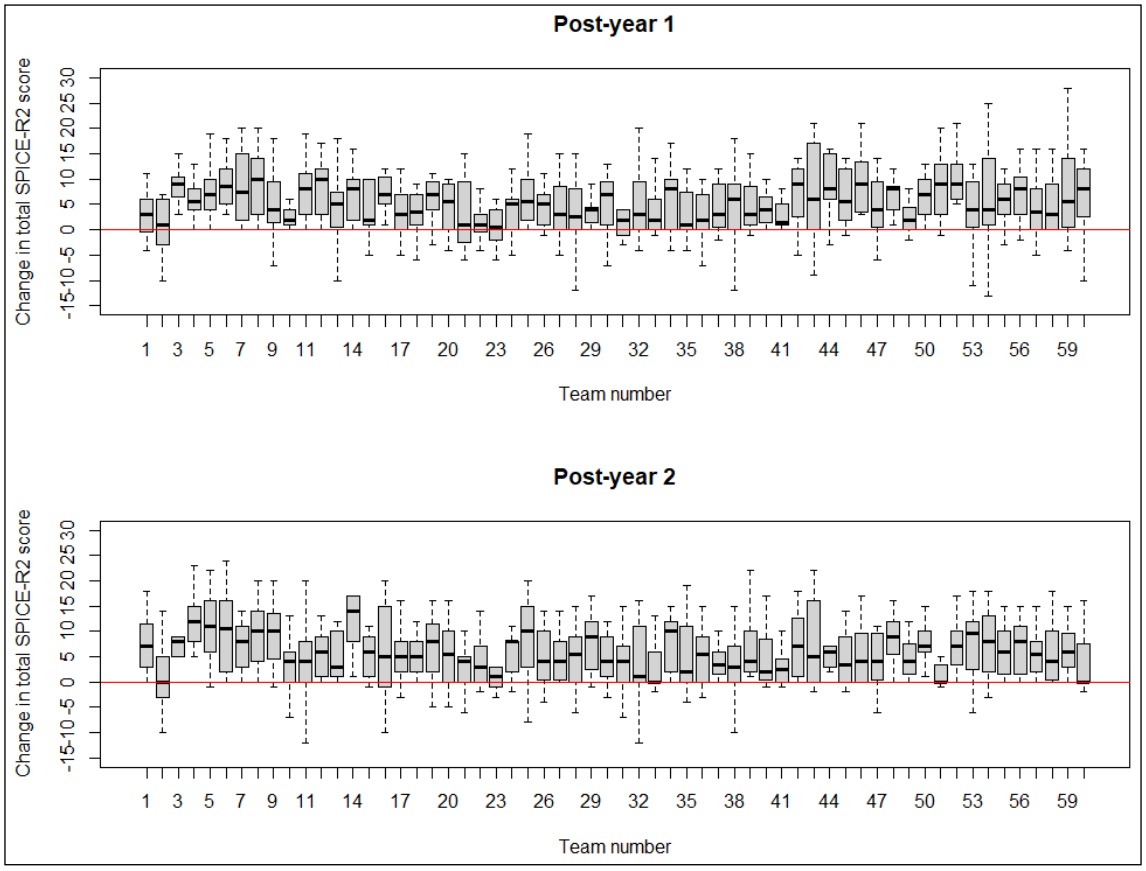

Figure 1 Boxplots of 60 student teams, post-Year 1 and post-Year 2, change in SPICE-R2 total score.
Solid red line = reference line indicating zero change in total SPICE-R2 score.

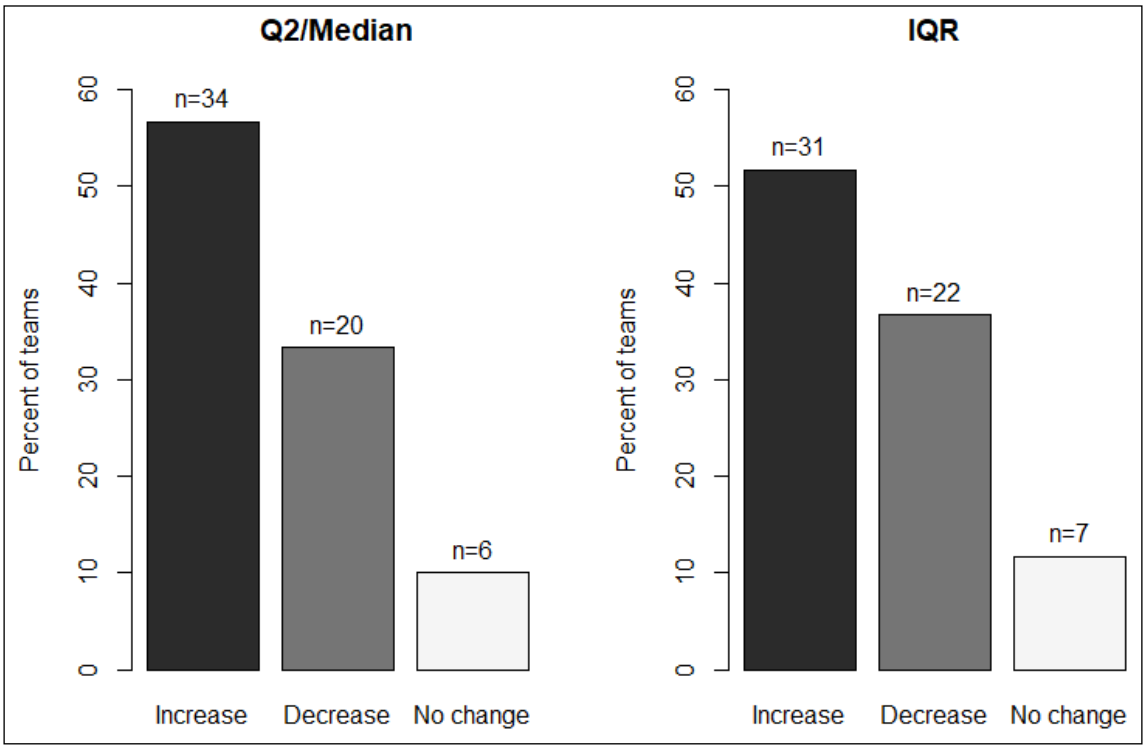

Figure 2 Percent of teams with a change in score for median and IQR (post-Year 1 to post-Year 2).

	POST-YEAR 1 MEAN (SD)	POST-YEAR 2 MEAN (SD)
Total score retro-pre mean	36.50 (6.12)	36.59 (5.88)
Total score post mean	41.78 (6.44)	42.47 (6.45)
Total score mean change	5.28 (7.09)	5.88 (6.89)
P value[1]	<0.001	<0.001
Cohen's d	0.84	0.95

Table 1 SPICE-R2 total score descriptive statistics (all-student level).

aggregate. In this case, however, the interaction indicates that relative changes in IPE attitudes (both increases and decreases in scores and their relative sizes) from Year 1 to Year 2 are driven by specific teams and their apparent diversity of construction. Conceptually, this finding seems justifiable as individual emotions, values, and beliefs are the bases of attitudes (Petty, Wegener & Fabrigar, 1997). Students from all professions were randomly assigned to the 60 teams with the purpose of having 6–7 different professions represented on each team. Characteristics such as lived experiences, motivations, or capabilities (which can impact the bases of attitudes) were unknown and not used in assigning members to teams. Therefore, the variability could have existed prior to TEAM UP™. A recent study found individuals exhibiting greater autonomous motivation were more likely to be on high-performing IPE teams (Ganotice et al., 2022). Additional research studying the bases of attitudes is needed.

While there were positive, negative, and neutral changes in team boxplot dispersion scores, there were multiple positive outcomes. When analyzing the change in team scores, there were four fewer teams with a negative minimum score when comparing post-Year 1 to post-Year 2. A comparison of Q2 and IQR from post-Year 1 to post-Year 2 also revealed a majority of teams exhibited an increase in scores. From a program evaluation perspective, it is concerning that 44 teams had at least one team member whose attitude changed in the negative direction after engaging in one year of the IPE curriculum. Additionally, approximately a third of teams were noted to have a decrease in Q2 from post-Year 1 to post-Year 2. While we are unable to provide definitive explanations for these negative outcomes, a discussion is warranted. This particular cohort of students engaged in the TEAM UP™ curriculum virtually for the two-year period. While we would need to review in-person student cohorts before and after the COVID-19 pandemic to make more substantial conclusions, learning how to work in teams via an online video platform may have negatively impacted socialization among the teams (Sjølie, Espenes, and Buø, 2022).

Additionally, over half of the teams had an increase in IQR from post-Year 1 to post-Year 2, indicating more variability in IPE attitudes among the team. Regardless if team IPE attitudes increased or decreased, future research should further investigate variables that impact attitudes with time as a factor. Another perspective to consider is an increased IQR indicates more diverse attitudes among team members. While a previous study indicated diverse (gender and race) management teams have better outcomes (McKinsey and Company, 2015), more research is needed to answer the question if greater diversity in IPE attitudes also correlates with improved team outcomes.

The second new finding detected significant differences in SPICE-R2 score changes over time at the all-student level. Providing a longitudinal curriculum is a component of the Health Professions Accreditors Collaborative (2019) guidance in developing quality IPE experiences. Based upon the results of this study, longitudinal IPE exposure has a positive impact on improving attitudes about IPE after one year and two years. Having the opportunity to develop trust, cohesion, and effective communication in a safe environment can be considered a unique and positive aspect of the TEAM UP™ curriculum. Exploring underlying characteristics of high-quality and transformative IPE to support future collaborative practice remains essential. However, there is a significant lack of research in this area (Fox, 2018). While the use of an attitudinal instrument provided an opportunity to begin the discussion, more research is needed.

Some limitations of the study design are evident. We used a RPP design approach to address response shift bias. However, the use of RPP has its own limitations including social desirability bias, effort justification bias, self-inflation bias, and recall bias (Hill, 2020). Our assessment data relies on a single instrument (SPICE-R2). Incorporation of additional evaluations of team perceptions such as the Agency for Healthcare Research and Quality's TeamSTEPPS Teamwork Attitude Questionnaire (T-TAQ) could provide either confirmatory or discriminatory value in assessing individual teams. Additional valuable elements for future research would be inclusive of qualitative data to gain insight into trait and interpersonal dimensions not reflected in the SPICE-R2 survey. Furthermore, identifying specific theory or frameworks, such as the interprofessional socialization framework (Khalili, 2013) or contact theory (Allport, Clark, & Pettigrew, 1954), supporting the research and respective assessments could help identify variables that impacted attitudes and subsequent behavior change. Also, designing education interventions that can impact behavior change also needs further investigation. Using the Capability, Opportunity, Motivation – Behavioral system (COM-B) (Michie, van Stralen, & West, 2011) for example, as a framework for understanding the factors that impact

behavior will also support a rigorous design and subsequent evaluation of IPE research.

This study provides another perspective of the impact of a longitudinal curriculum. While the all-student level change in IPE attitudes demonstrated positive changes, outcomes at the team level provided an opportunity for a new discussion that has more applicability in the development of collaborative-practice ready health professionals. Specific to this one institution and the single student cohort, there were improvements, declines and no changes noted at the team level. Future considerations for the second year of the curriculum could include an intervention to support teams who demonstrated a decline in perceptions after Year 1.

This is the first study the authors are aware of that views longitudinal outcomes at the team level. More research is desperately needed in this area. Controlling for or investigating the multitude of factors that can impact attitudes will be challenging. However, this level of information will be needed to ultimately understand how the attitude developed within IPE teams can impact future behavioral intent. Future research at the team level will support the advancement of interprofessional science (Xyrichis, 2020), strengthening the connection between education and practice.

CONCLUSION

Evaluating IPE outcomes at the team-level can provide insight into the impact of longitudinal curricula on differential team dynamics over time. Such closer analysis will support the advancement of interprofessional science.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

TG: Conceptualization, Methodology, Writing-Original Draft, Writing-Review & Editing; **HM:** Methodology, Formal Analysis, Writing-Original Draft; **SD:** Investigating, Writing-Review & Editing **SE:** Writing-Review & Editing; **CB:** Writing-Review &Editing.

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