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PREPARING IS STUDENTS WITH EFFECTIVE TEAM SKILLS

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ABSTRACT

Studies have continually demonstrated the importance of team skills in information systems (IS) graduates. All too often, however, undergraduates find team projects to be frustrating because of poor team dynamics. This study was conducted to evaluate a structured team design and instruction process and its impact upon team outcomes. Twenty-four undergraduate System Analysis and Design teams were examined over a four-year period. Results suggest strong positive correlations between five instructional components and team outcomes.

Keywords: Team Skills, Team Effectiveness, System Analysis and Design, Undergraduates, Empirical Survey

INTRODUCTION

Team skills, which include communication skills, rank as one of the primary assets necessary for a position within the IS field. Studies involving IS alumni/professionals, job postings, recruiters, and students consistently demonstrate the importance of team skills.

IS alumni from 2000 to 2004, for example, were surveyed to determine what communication skills they use most often in the workplace [3]. Teamwork skills were rated as "very important" by the largest number (81%) of respondents and intragroup (within a group) communication was the fourth most common type of oral communication, as indicated by 55% of respondents. Another study of graduates from 1990 to 2002 found that team interaction was the highest valued instructional skill [9]. A survey of information technology professionals also illustrates that for new hires/entry-level positions and current employees, the most critical competency (indicated by 79% and 88% of respondents, respectively) is non-technical professional competency [6]. Non-technical professional competencies include teamwork, communication, ethics, problem solving, and time management.

Furthermore, an examination of 902 job postings on Fortune 500 corporate web sites found that of the 59 skill requirements listed, communication skills were the third most common skill (listed in 72% of the ads) [7]. The ability to work with users and team members was the seventh most common skill (listed in 66% of the ads). Moreover, a survey of U.S. IS recruiters indicates that the most wanted skills/knowledge/personal attributes for entry-level IS employees are team skills and communication skills [4]. In terms of IS careers and advancement, recruiters and students rate teamwork skills as the second most important general skill needed [8].

The dilemma is how to incorporate teams into a course but still be able to cover the primary course content and enable students to learn to be successful, skillful, and satisfied team members. A study of an online MBA education program, for example, found that virtual team learning was significantly correlated with learning satisfaction [5]. As a result, this paper examines how a structured methodology employed to enhance the team experience effects learning outcomes in a System Analysis and Design course, a course ranked by IS professionals as the second most important course and competency [6, 9].

TEAM INSTRUCTIONAL DESIGN

Teams were formed and provided with team dynamics' instruction through the use of six steps. The steps include a draft session to distribute skills, sending/receiving messages instruction, decision-making instruction, consensus instruction, a survival exercise, and a fishbowl exercise [1, 2]. The six-step process requires approximately three hours of in-class time.

The first step involves forming teams. Teams are populated through use of coded (anonymous) student resumes that are selected by instructor-chosen team coordinators during a randomized draft session. The second step involves providing and discussing handouts that detail how to send and receive messages effectively. The third step involves discussing the pros and cons of various types of decision-making methods such as decision by authority after discussion, majority control, and minority control. In addition, factors that hamper decisions (such as social loafing) are presented. The fourth step is to conduct an in-depth session on how to achieve consensus. The fifth step is to utilize a paper-based survival exercise. The exercise is completed individually and then using consensus,

completed within the newly formed teams. When all teams have completed the exercise, the solution is read and scores are calculated. During debriefing, individual and team scores are detailed, ranked, and averaged. Generally, the team score is better than the individual team member score and the average of individual scores. Overall, the purposes of this phase are to increase the credibility of the "team" concept and to initiate the team bonding experience. The final step is to use a fishbowl exercise to illustrate group dynamics and process. One team is selected at random to be in "the fishbowl," a circle formed in the classroom center. Other teams serve as observers and are quietly given instructions to monitor the fishbowl team as it performs a simple five-minute task (e.g., decide, as a group, how to spend $1,000). Observers monitor direction of communication, quantity of communication, and social-emotional/task behavior of fishbowl members. Once consensus is achieved, observer results are presented. The purpose of the fishbowl exercise is to identify strengths and weaknesses within the group's processes.

Students are then given a sophisticated eight-part team project. A similar project was given to each study team during the four-year period. The project involved the team locating, selecting, and analyzing an organization in need of a computerized information system. The company had to be approved by the instructor by the fifth week of class. Team projects were primarily differentiated by random budgets, project schedules, and the system that each team chose. No teams were permitted to analyze an organization that had been studied by a prior team.

A written project report of the first four components was due midway through the semester and the final report (containing the remaining four parts) was due during the last week of the semester. A formal classroom presentation was also required when each phase of the report was due. The first four components involved an organization overview, initial investigation, project plan, and data flow diagrams. The final four parts involved a candidate systems evaluation, data modeling, output designs, and input designs. Teams were empowered to dismiss and to grade the participation of team members. All team members, however, receive the same grade on the report and presentation components.

RESEARCH DESIGN

This study employs a longitudinal survey research design. The research was conducted at a private, northeastern U.S. university. A Student Team Effectiveness survey instrument was developed and administered during a four-year period to undergraduate students enrolled in a junior-level System Analysis and Design course. The same IS faculty member conducted each class section.

The survey instrument was utilized to collect student demographic data and examine student perceptions regarding instruction effectiveness and team outcomes. The survey requested that each student rate six instructional items and three abilities/constraints on a five-point Likert-style scale relative to the item's effect on his/her team's overall effectiveness. Respondents were also asked to rate five outcomes/characteristics on a five-point Likert-style scale on a range from poor to excellent. Finally, students were requested to estimate the average number of minutes per week that he/she participated on the project individually and with team members. The survey was administered during the final week of each 15-week course and all surveys were anonymous. Moreover, students were informed that results would have no effect on their semester grade.

RESULTS

A sample of 86 usable surveys was obtained. Sixty percent of the respondents were male and 40% were female. Twenty-four teams were examined during the four-year study period (Table 1). Respondents indicated that each had been a member on an average of six teams prior to this class. With regard to the System Analysis and Design project, students estimated that each spent over one hour (69 minutes) per week individually and more than one and one-half hours (96 minutes) per week with the team. Overall, the nearly three hours required per week demonstrates the level of project rigor.

Table 1. Summary Statistics

Category	
# of Teams	24
Average # of previous team experiences per student	6
Average # of minutes per week spent individually on project	69
Average # of minutes per week spent with team on project	96

Instructional activity Likert-style data was first summarized by response percentage. Table 2 depicts, for example, that one percent of students did not respond to the question regarding the draft session

used to distribute skills. Nineteen percent indicated that the draft session had no effect on team effectiveness. Sixty-nine percent found that the draft session had a moderate effect in increasing effectiveness and 12% indicated it highly increased effectiveness. When examining the six instructional activities, the majority of respondents indicated that each activity had primarily a moderate positive effect in increasing team effectiveness. Moreover, the survival exercise was seen as highly increasing team effectiveness by more than one-forth (26%) of students. The fishbowl exercise was seen as highly increasing team effectiveness by one-fifth of students.

Table 2. Instructional Activity Effectiveness by Percentage

Instructional Activity	No Response	Greatly Decreased	Mod. Dec.	No Effect	Mod. Inc.	Highly Increased
Draft session to distribute skills	1%	0%	0%	19%	69%	12%
Sending/receiving messages	1%	0%	2%	22%	65%	9%
Decision-making instruction	1%	0%	0%	24%	57%	16%
Consensus instruction	1%	0%	1%	21%	59%	17%
Survival exercise	0%	0%	0%	30%	44%	26%
Fishbowl exercise	2%	0%	0%	34%	44%	20%

Spearman Rho non-parametric tests were next performed to determine if any correlations exist between the instructional activities and team outcomes. Table 3 illustrates that several correlations exist. The draft session is positively correlated with decision effectiveness, team cohesiveness, and the overall team experience at the .01 significance level and with project quality at the .05 level. The decision-making instruction is positively correlated with the overall team experience and current team experience at the .01 significance level and with team cohesiveness at the .05 level. The consensus instruction is positively correlated with decision effectiveness, team cohesiveness, project quality, and the overall team experience at the .01 significance level. The survival exercise and fishbowl exercise are positively correlated with decision effectiveness at the .01 significance level and with team cohesiveness and the overall team experience at the .05 level. Conversely, the sending/receiving messages instruction has no significant effect on team outcomes.

Table 3. Spearman RhoCorrelations Between Instructional Activity and Team Outcomes

Instructional Activity	Decision Effectiveness	Team Cohesiveness	Project Quality	Overall Team Experience	Current Experience Compared to Previous Teams
Draft session to distribute skills	.378**	.429**	.274*	.341**	.208
Sending/receiving messages	.134	.167	.075	.169	.098
Decision-making instruction	.169	.261*	.074	.302**	.340**
Consensus instruction	.306**	.420**	.290**	.286**	.182
Survival exercise	.362**	.254*	.145	.268*	.095
Fishbowl exercise	.323**	.241*	.201	.224*	.052

** correlation significant to .01 level (2-tailed)
*correlation significant to .05 level (2-tailed)

By examining team outcomes, it is apparent that certain instructional activities are more important. The draft session, consensus instruction, survival exercise, and fishbowl exercise have the highest positive correlation significance in terms of decision effectiveness. The draft session and consensus instruction have the highest positive correlation significance in terms of team cohesiveness. The consensus instruction has the highest positive correlation significance in terms of project quality. The draft session, decision-making instruction, and consensus instruction have the highest positive correlation significance in terms of the overall team experience. The decision-making instruction has the highest positive correlation significance in terms of the current experience as compared to previous team experiences.

Finally, Spearman Rho correlations were calculated to determine relationships between abilities/constraints and team outcomes (Table 4). The ability to dismiss members has no significant effect on team outcomes. However, the ability to grade others is positively correlated with the overall team experience at the .01 significance level and with decision effectiveness at the .05 significance level. In addition, the same project grade for all team members is positively correlated with team cohesiveness, the overall team experience, and current team experience at the .05 significance level.

Table 4. Spearman RhoCorrelations Between Ability/Constraint and Team Outcomes

Ability/Constraint	Decision Effectiveness	Team Cohesiveness	Project Quality	Overall Team Experience	Current Experience Compared to Previous Teams
Ability to dismiss members	.113	.075	.074	.154	.191
Ability to grade other members	.232*	.190	.129	.302**	.189
Same project grade for all members	.195	.308*	.084	.235*	.237*

** correlation significant to .01 level (2-tailed)
* correlation significant to .05 level (2-tailed)

CONCLUSIONS AND FUTURE RESEARCH

Results suggest that information students are exposed to several team experiences. Survey respondents indicated that each had participated on an average of six teams prior to the System Analysis and Design class. Moreover, analysis by response percentage demonstrates that each of the six instructional activities had primarily a moderate positive effect in increasing team effectiveness. Moreover, more than one-forth (26%) of students indicated that the survival exercise highly increased team effectiveness. The fishbowl exercise was seen as highly increasing team effectiveness by one-fifth of students.

Findings also indicate several positive correlations at the .01 significance level between the instructional activities and team outcomes. The draft session is positively correlated with decision effectiveness, team cohesiveness, and the overall team experience. The decision-making instruction is positively correlated with the overall team experience and current team experience. The consensus instruction is positively correlated with decision effectiveness, team cohesiveness, project quality, and the overall team experience. The survival exercise and fishbowl exercise are positively correlated with decision effectiveness.

By examining team outcomes, it is apparent that certain instructional activities are more important. The draft session, consensus instruction, survival exercise, and fishbowl exercise have the highest positive correlation significance relative to decision effectiveness. The draft session and consensus instruction have the highest positive correlation significance relative to team cohesiveness. The consensus instruction has the highest positive correlation significance relative to project quality. The draft session, decision-making instruction, and consensus instruction have the highest positive correlation significance relative to the overall team experience. The decision-making instruction has the highest positive correlation significance relative to the current experience as compared to previous team experiences.

Finally, two abilities/constraints were correlated with team outcomes. The ability to grade others is positively correlated with the overall team experience at the .01 significance level and with decision effectiveness at the .05 significance level. In addition, the same project grade for all team members is positively correlated with team cohesiveness, the overall team experience, and current team experience at the .05 significance level.

There are several important implications as a result of these findings. One implication is that although faculty consider team experiences to be an important component of undergraduate education, students are not being properly prepared for a successful team experience.

A second implication is that team skills and effectiveness can be enhanced through the use of structured team design and team dynamics instruction processes. Although it is easy to give students a project, without proper skills, students do not always maximize the intended learning experience and feel frustrated when a team project is required in a course.

A third implication is by empowering teams and providing constraints, team effectiveness can be increased. By giving students the ability to grade team members and by giving all team members the same grade, individuals may have a stronger internal locus of control and feel that other team members will be more accountable to the team.

A final implication is that some factors may not significantly contribute to the positive and effective team experience. The sending/receiving messages instruction and ability to dismiss members had no significant effect on team outcomes. However, the sending/receiving messages instruction is useful when employing the survival and fishbowl exercises. In addition, although the ability to dismiss members is rarely used, it may be an underlying deterrent to member free-loading and social-loafing.

One limitation of this study is a function of sample size. A larger sample size, use of additional universities, and more equal distribution of respondents by gender would increase the robustness of results. Another limitation relates to the self-reported nature of the survey. Students are using recall thus recency effects may occur. In addition, the Hawthorne Effect may be evident.

Future research should be directed at examining appropriate team size, individual accountability, and if gender affects team effectiveness. Findings from such research would be useful in determining optimum team composition. Overall, the current results and future research are important pedagogical findings that will assist IS faculty is improving student project quality and maximizing student learning.

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