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Improving Team Effectiveness of College Student Association of Science and Technology Innovation at Zhanjiang University of Science and Technology in China

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Abstract

This study aimed to explore pathways to enhance the team effectiveness of college student association and examine their impacts on student development. Focusing on the College Student Association of Science and Technology Innovation (CSASTI) at Zhanjiang University of Science and Technology (ZUST), the research employed Organizational Development Intervention (ODI) to improve communication, innovation, incentive, and leadership skills to enhance team effectiveness. A mixed-methods approach was adopted, combining questionnaire surveys and semi-structured interview, with a sample of 40 students participating in a three-month intervention. During the intervention, four targeted workshops were conducted, including the fishbowl conversation workshop for communication, the skills training workshop for innovation, the goal setting workshop for incentive, and the appreciative inquiry workshop for leadership skills. Data analysis revealed significant differences in all five variables before and after the ODIs, indicating that targeted ODI strategies could effectively improve team effectiveness. The findings suggest that by optimizing communication mechanisms, fostering innovative thinking, refining incentive systems, and strengthening leadership skills, the student association can not only increase operational team effectiveness but also better support student growth and development. This study provides practical insights and a feasible framework for improving the management of college student associations.

Keywords: Team Effectiveness, Communication, Innovation, Incentive, Leadership Skills

Introduction

Teams exist in our lives and work, and researches on team effectiveness are of great value to various organizations (Kozlowski & Ilgen, 2006). Understanding and enhancing team effectiveness is crucial not only in professional contexts but also within student associations, where collective activities can exercise and improve students' comprehensive qualities. The experience of the student association is undoubtedly beneficial to the growth of college students, whether in terms of academic expertise or students' future career growth (Amiranzadeh et al., 2011). Thus, team effectiveness is significant for developing student associations and students themselves. Investigating team effectiveness in the context of college student associations is

particularly valuable, as it can reveal the key factors that drive successful collaboration, optimize organizational functioning, and maximize the developmental benefits for student members. However, while team effectiveness has been extensively studied in corporate and professional settings, there is limited understanding of how these dynamics operate within student associations. With high team effectiveness, student associations can strengthen students' educational outcomes and enhance their overall functional impact.

Case Context and Organizational Assessment

Zhejiang University of Science and Technology (ZUST), which is actively building itself into an innovation and entrepreneurship university, the College Student Association of Science and Technology Innovation (CSASTI) plays an important role in promoting innovation and entrepreneurship education. As a student association under the School of Innovation and Entrepreneurship, CSASTI provides students with opportunities to apply theoretical knowledge in real projects, develop problem-solving abilities, and cultivate a culture of innovation. This research aims to evaluate the team effectiveness of CSASTI, offering insights into how such students associations serve as platforms for students to show their talents and support their all-round developments.

The researcher used SWOT analysis to analyze the team effectiveness of CSASTI. The SWOT analysis reveals that it has strong support from the School of Innovation and Entrepreneurship with abundant resources in innovation and entrepreneurship, and it benefits from diverse student membership which facilitates interdisciplinary collaboration. Regarding weaknesses, CSASTI experiences inadequate communication, limited innovation, shortage of incentives, and insufficient leadership skills. In terms of opportunities, China has placed significant emphasis on innovation and entrepreneurship education for college students. As for threats, intense competition from similar teams or associations poses a considerable challenge. Based on the above problems, including inefficient communication, low innovation, inadequate incentive, poor leadership skills, if they're not solved in time, it will greatly affect the team effectiveness of CSASTI.

Research Objective

To improve the team effectiveness of CSASTI, the research objectives are established as follows:

1. To examine the current team effectiveness of CSASTI from the aspects of communication, innovation, incentive and leadership skills
2. To design and implement appropriate ODIs to improve students' communication, innovation, incentive and leadership skills, thereby enhancing team effectiveness
3. To compare the difference in communication, innovation, incentive, leadership skills and team effectiveness before and after ODI in terms of quantitative and qualitative data
4. To provide recommendations for student associations to improve team effectiveness based on the findings

Research Questions

The research questions are based on the objectives. A mixed methods design is used to explore them, incorporating both quantitative and qualitative data.

1. What is the current status of communication, innovation, incentive and leadership skills of students in the CSASTI?
2. What ODIs can improve the communication, innovation, incentive, leadership skills of students in the CSASTI?
3. What is the difference of the communication, innovation, incentive, leadership skills and team effectiveness before and after ODI?
4. What are the recommendations for student associations to improve team effectiveness based on the findings?

Literature Review

Team Effectiveness

The concept of team effectiveness has been a central focus in organizational research recently. Piña et al. (2008) define it as the ability of a team to survive, adapt, sustain, and develop, encompassing three key dimensions, including performance effectiveness, attitudinal outcomes, and behavioral outcomes. This highlights the complexity of team dynamics and the various factors that contribute to a team's success. For instance, team effectiveness is often measured through tangible outputs such as productivity, efficiency, and quality, both at the team and individual levels (J. E. Mathieu & Gilson, 2012). These metrics provides a quantitative assessment of a team's ability to achieve its goals. Attitudinal outcomes focus on the subjective experiences of team members, including satisfaction, cohesion, and trust. Behavioral outcomes involve the actions and interactions of team members, which can significantly impact team dynamics and performance. Hussein et al. (2018) identify some key factors influencing team effectiveness among Malaysian engineering students, emphasizing the importance of team satisfaction and interpersonal confidence in achieving predetermined goals. This underscores the significance of psychological factors in fostering a positive team environment for success. While these studies converge on the view that team effectiveness is a multidimensional construct. Piña et al. (2008) provide a comprehensive yet abstract framework, Mathieu and Gilson (2012) emphasize quantifiable outcomes, and Hussein et al. (2018) highlight psychological factors in educational contexts. This variation reveals both common agreement on the complexity of team effectiveness and a knowledge gap in how these different dimensions interact, particularly across diverse cultural, educational, and professional settings.

Communication and Team Effectiveness

Communication is a fundamental attribute of human interaction and plays a critical role in team effectiveness. Effective communication fosters information exchange, builds trust, and enhances team performance (Bhat et al., 2017). Communication is not only a means of sharing information but also a way to create a shared vision and maintain flexibility in its implementation (M. D. Mumford et al., 2000). In educational settings, effective communication has been shown to enhance teamwork and collaboration. Monks and Mackay (2024) find that open communication and mutual support are critical for effective teamwork among student

radiographers. Similarly, Sachmpazidi et al. (2021) emphasize the importance of psychological safety in fostering open communication and idea-sharing within teams. Although both Monks and Mackay (2024) and Sachmpazidi et al. (2021) stress the importance of communication in educational teamwork, they focus on different elements—relational support versus psychological safety—suggesting a need for further research into how these dimensions interact and support effective collaboration among student associations.

Innovation and Team Effectiveness

Innovation is increasingly recognized as a vital component of organizational practices, contributing significantly to organizational change and development (Anderson et al., 2014). Innovation requires resources and support from individuals and is influenced by factors such as team composition, knowledge integration, and leadership (Thayer et al., 2018). Research has shown that a supportive learning climate and psychological safety are critical for fostering innovation (Benjamin et al., 2014; Sachmpazidi et al., 2021). It's confirmed that psychological safety and a positive team learning atmosphere are key to innovation, but there is still room for improvement in the universality of their formation mechanisms in different contexts, especially in informal organizations such as student associations. The implementation of design thinking in public health education, for example, has been found to enhance students' innovation capabilities and knowledge (Abookire et al., 2020). Innovation is not just about generating new ideas but also about implementing these ideas effectively.

Incentives and Team Effectiveness

Incentives play a significant role in motivating individuals and teams to achieve desired outcomes. The concept of incentives is rooted in behaviorism, where behavior is influenced by external rewards or the avoidance of punishments (Gneezy et al., 2011). Incentives can be both tangibles, such as monetary rewards, and intangible, such as praise or recognition (Cerasoli et al., 2014). Research has shown that a sense of responsibility, often shaped by incentives, is crucial for promoting team effectiveness (Sachmpazidi et al., 2021). Effective incentive mechanisms align individual and organizational goals, enhancing team performance and collaboration (Stewart et al., 2018). This variation reveals consistencies in the overall impact of incentives but also contradictions in their mechanisms and contexts, pointing to a knowledge gap regarding how different types of incentives interact and under what conditions they are most effective.

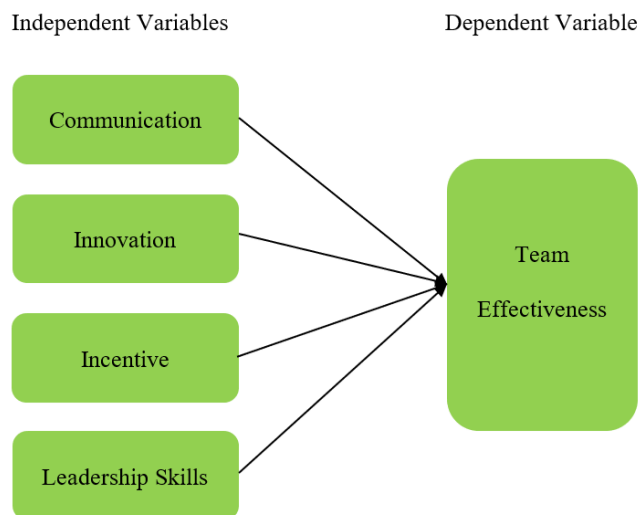
Leadership Skills and Team Effectiveness

Leadership skills are essential for guiding teams towards achieving common goals and have a significant impact on team effectiveness. Essential leadership skills include cognitive, interpersonal, business, and strategic competencies, which vary with organizational level (T. V. Mumford et al., 2007). Effective leadership skills foster team cohesion, trust, and psychological safety, which are critical for team performance (J. Mathieu et al., 2008). Leadership development programs have been shown to enhance students' leadership skills and team performance (Lewis, 2024). These studies underscore the vital role of leadership skills in influencing team effectiveness, they differ in focus and context, revealing a need for further research on how these skills interact with team dynamics and adapt across diverse organizational and educational settings.

Based on the literature review and analysis of the CSASTI, the researcher presents the conceptual framework (see Figure 1) and action research framework (see Figure 2).

Figure 1

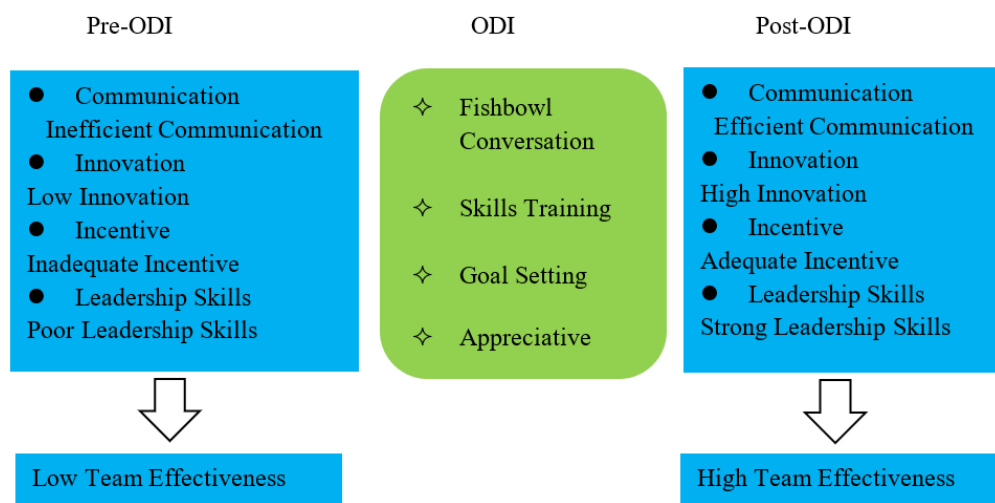
Conceptual Framework



Training is the most commonly studied approach and stand the best chance of being effective (Buljac-Samardzic et al., 2020). Therefore, in the ODI process, the researcher adopted four different training workshops for four independent variables in action research framework (see Figure 2).

Figure 2

Action Research Framework



Research Methodology

Based on the analysis above, there are five hypotheses on communication, innovation, incentive, leadership skills and team effectiveness, which are shown below.

Research Hypotheses

H1₀: There is no significant difference between Pre ODI and Post ODI in communication.

H1_a: There is a significant difference between Pre ODI and Post ODI in communication.

H2₀: There is no significant difference between Pre ODI and Post ODI in innovation.

H2_a: There is a significant difference between Pre ODI and Post ODI in innovation.

H3₀: There is no significant difference between Pre ODI and Post ODI in incentive.

H3_a: There is a significant difference between Pre ODI and Post ODI in incentive.

H4₀: There is no significant difference between Pre ODI and Post ODI in leadership skills.

H4_a: There is a significant difference between Pre ODI and Post ODI in leadership skills.

H5₀: There is no significant difference between Pre ODI and Post ODI in team effectiveness.

H5_a: There is a significant difference between Pre ODI and Post ODI in team effectiveness.

Research Design

This study used ODI to improve the students' communication, innovation, incentive and leadership skills, thereby affecting team effectiveness of CSASTI. To ensure the comprehensiveness and depth of this study, mixed research methods were adopted. Firstly, quantitative methods, including questionnaires and data analysis, were used to collect data from selected 40 students in CSASTI and identified underlying issues affecting team effectiveness. Subsequently, qualitative methods such as semi-structured interview of 12 students were conducted to gain a deeper understanding of the problems faced by the CSASTI. During the ODI process, four workshops were implemented to address key independent variables related to communication, innovation, and incentive, leadership skills. Finally, data was collected from questionnaire and semi-structured interview again. By comparing pre-ODI and post-ODI data with data analysis tools to explore the impact of intervention outcomes on team effectiveness (see Table 1).

Table 1*Schedule of ODI Research Process*

Schedule	Content
May	• To conduct the questionnaire survey and interview then analyze the data
	• To prepare for four Workshops including appropriate venue and timing for students necessary materials and equipment
	• To conduct the Fishbowl Conversation Workshop for Communication
June	• To conduct the Skills Training Workshop for Innovation
	• To conduct the Goal Setting Workshop for Incentive
July	• To conduct the Appreciative Inquiry Workshop for Leadership Skills
	• To conduct the questionnaire survey and interview then compare the data in May
	• To analyze the data and results of the whole research

Research Sampling

The researcher adopted a voluntary registration method in CSASTI. Students who were interested in improving team effectiveness of CSASTI and promised to attend all the activities of four workshops registered by scanning the QR code on the screen. After the registration was completed, the researcher adopted a stratified random sampling method based on the information collected. Although the voluntary sign-up process may introduce self-selection bias, it helped ensure students' sustained engagement throughout the ODI. To mitigate this limitation, the researcher employed random sampling to enhance the representativeness of the sample. When stratified random sampling was used, the target population was divided into several non-overlapping "layers", and the sample size was determined based on the characteristics of the layer, and the samples were selected using simple random sampling (Alzahrani & Almohaimeed, 2025). The researcher firstly divided the registered students into three levels according to their positions: president, minister and member; then a total of forty students were randomly selected to participate in the follow-up training. This method ensured a reasonable proportion of members at different levels in the samples, and enhanced the representativeness of the sample and the reliability of the research results.

Research Instrument

In order to better understand the team effectiveness of CSASTI, this study was mainly carried out through data collection and analysis, which used questionnaires and semi-structured interview. The questionnaire consisted of 5 variables and 26 items, using a five-point Likert scale, with 1 representing Strongly Disagree, 2 representing Disagree, 3 representing Neutral, 4 representing Agree, 5 representing Strongly Agree. The design of the questionnaire aimed to capture students' perceptions and feelings regarding the 5 variables.

Before applying the questionnaire, six organizational development experts were invited to evaluate and mark the scores of the 26 items for Item - Objective Congruence test. After

calculating the scores, all items' scores were above 0.66. Therefore, the questionnaire was ready for the pilot test. The researcher invited 30 students who were from another student association in ZUST to complete the questionnaire. The Cronbach's Alpha values for all variables exceeded 0.7 (see Table 2), indicating strong internal consistency and reliability for the entire questionnaire, which was generally considered acceptable in research. Therefore, the questionnaire was ready for the research.

Table 2

Reliability Statistics of 5 variables

Variable	Number of Items	Cronbach's Alpha
Team Effectiveness	5	0.772
Communication	5	0.861
Innovation	6	0.797
Incentive	5	0.736
Leadership Skills	5	0.766

Semi-structured interview comprised five standard questions (see Table 3) with the option to introduce additional questions dynamically based on the student's responses, which would be answered by 12 students before and after ODI. This approach aimed to facilitate a thorough examination of pertinent issues, ensuring that all relevant information is captured for in-depth analysis in the subsequent study.

Table 3

Semi-Structured Interview's Questions

Number	Variable	Question
1	Team Effectiveness	How do you feel about the current team effectiveness of CSASTI?
2	Communication	How effective do you think the primary means of communication within CSASTI?
3	Innovation	How does the CSASTI encourage innovative ideas or approaches?
4	Incentive	What incentives do you and other members think it's important in CSASTI?
5	Leadership Skills	How would you plan to improve your leadership skills?

Data collection and analysis

To deeply investigate the team effectiveness of CSASTI, this research would use a mixed-methods, integrating both quantitative and qualitative analysis. The quantitative data was from the questionnaire in pre-ODI and post-ODI; the qualitative data was from the semi-structured interview in pre-ODI and post-ODI.

(1) The quantitative analysis for this research would use statistical instruments, including standard deviation, mean to analyze the quantitative data. The questionnaire survey served as one of the foundational data sources for this study. It was administered both before and after the implementation of the intervention. The design of the questionnaire aimed to capture students' perceptions and feelings regarding team effectiveness and four independent variables. By comparing the pre-ODI and post-ODI data, clear changes brought about by the organizational development intervention could be traced, providing quantifiable evidence for subsequent analyses.

(2) The qualitative analysis for this research was thematic analysis, which was a strategy for pinpointing, scrutinizing, and documenting recurring themes within data (Braun & Clarke, 2019). For content analysis, the researcher and the other two teachers encoded the interview data and extracted categories and core themes. The twelve students in semi-structured interview from a total of forty participated students focusing on five questions. The interviews were audio-recorded to ensure accurate documentation of the students' responses. Following the interviews, the researcher, along with two additional teachers serving as independent coders, carefully reviewed the interview transcripts. To ensure consistency and reduce subjectivity, the three coders independently coded the transcripts and then met to compare their initial codes, resolve discrepancies, and reach consensus on the final categories and themes. Meaningful excerpts were then coded based on their relevance and content. These initial codes were grouped into categories that reflected recurring ideas or experiences, and were further synthesized into broader themes related to the five variables under investigation.

(3) A mixed methods research strategy was employed, integrating quantitative data with qualitative insights. Because the data did not follow a normal distribution, Wilcoxon signed-rank test was used to analyze the quantitative data. This survey aimed to measure the impact of ODI measures on organizational effectiveness through statistical methods. By comparing the data before and after ODI implementation, the researcher could quantify the specific improvement of ODI on CSASTI. On the other hand, qualitative understanding stemmed from thematic insights extracted from semi-structured interview conducted before and after ODI implementation, which provided rich information for understanding the perspectives, attitudes, and feelings of the students. Through thematic analysis, the researcher identified key themes related to organizational effectiveness that reflect students' views on ODI measures and their impact on overall organizational performance. By comprehensively considering the conclusions drawn from these two analysis methods, the researcher could propose effective suggestions to enhance team effectiveness. Quantitative data provided clear evidence of the effectiveness of ODI measures, while qualitative insights supplement students' subjective experiences and opinions. By combining these two perspectives, the researcher could have a more comprehensive understanding of the team effectiveness of ODI measures and propose targeted improvement suggestions based on this to promote the continuous improvement of CSASTI.

Data Analysis and Results

Following the collection of questionnaire data, descriptive statistics including mean and standard deviation (SD) were initially computed to examine the central tendency and variability of the variables before and after the intervention. The results indicated an increase in mean values and a reduction in SD values from pre-ODI to post-ODI, suggesting a potential effect of the intervention. However, normality tests revealed that the distribution of the differences between pre-ODI and post-ODI scores significantly deviated from normality. Given this situation, the Wilcoxon signed-rank test—a non-parametric alternative—was subsequently employed to determine whether the observed changes were statistically significant. As for the interview data of the 12 students, they were analyzed using thematic analysis by three teachers including the researcher.

Quantitative Research Results

A comprehensive quantitative data analysis, including mean, the SD, normality test and Wilcoxon signed-rank test, which had been conducted on variables before and after ODI, revealing significant transformations across various dimensions.

For mean test (see Table 4), the pre-ODI mean for communication stood at 2.89, which notably increased to 4.49 post-ODI, indicating a substantial enhancement in communication effectiveness within the CSASTI. Similarly, innovation had initially scored a mean of 3.07 but escalated to 4.50 following the ODI, highlighting the positive impact on fostering a culture of innovation. The incentive variable, which began with a mean score of 2.94, saw a marked improvement to 4.46 after the intervention, reflecting a more effective incentive structure that likely motivated employees. Leadership skills, initially measured at 3.03, similarly advanced to 4.50, underscoring the development of stronger leadership capabilities throughout the organization. Team effectiveness, starting at a pre-mean of 3.01, also experienced a considerable leap to 4.41 post-ODI, indicating a significant boost in overall team performance. Moreover, SD for these variables had undergone changes. For instance, while the pre-SD for communication was 0.3136, it decreased to 0.1916 post-ODI, indicating a reduction in variability and greater consistency in communication practices. Likewise, the SDs for other variables such as innovation, incentive, leadership skills, and team effectiveness had reduced, pointing towards a more uniform application of these skills and practices across the board. The analysis of mean and SD had demonstrated that the ODI had addressed key areas of organizational development, leading to improved communication, enhanced innovation, better incentives, stronger leadership skills, and increased team effectiveness. These improvements had not only elevated the overall performance metrics but also fostered a more cohesive and dynamic work environment.

Table 4*Quantitative Data Analysis of Mean and SD in Pre and Post-ODI*

Variable	Pre-Mean	Post-Mean	Pre-SD	Post-SD
Communication	2.89	4.49	0.3136	0.1916
Innovation	3.07	4.5	0.244	0.2135
Incentive	2.94	4.46	0.3455	0.257
Leadership Skills	3.03	4.5	0.2976	0.2353
Team Effectiveness	3.01	4.41	0.3121	0.3296

To further determine whether the intervention effect was significant or not, parametric methods were suitable for data that follow a normal distribution and were measured on at least an interval scale, while nonparametric alternatives were used when these conditions were not met (Bellera et al., 2010). Therefore, the researcher firstly conducted a normality test (see Table 5), to assess the distribution of the data. Based on the results of this analysis, especially whether the data met the assumption of normality, they determined whether to use a paired samples t-test or the Wilcoxon signed-rank test. If the data were normally distributed, the paired samples t-test was considered appropriate.

The Kolmogorov-Smirnov test had been applied alongside the Shapiro-Wilk test to assess the normality of each variable's distribution. For the pre-intervention variables, the Kolmogorov-Smirnov test showed significant deviations from normality for pre-TE, pre-communication, pre-innovation, and pre-leadership skills (LS), with significance levels all falling below 0.05. However, pre-incentive did not show a significant deviation, with a p-value of 0.025. Similarly, the Shapiro-Wilk test also revealed significant deviations from normality for these four variables, except for pre incentive, which approached but did not reach statistical significance at 0.094. In post-ODI, the situation changed slightly. The Kolmogorov-Smirnov test failed to indicate significant deviations from normality for post TE, suggesting that its distribution might have approximated normality following the intervention. Nevertheless, post-communication, post-innovation, post-incentive, and post-LS still exhibited significant deviations from normality according to this test. The Shapiro-Wilk test consistently found significant deviations from normality for all post-intervention variables, indicating that none of their distributions could be considered normally distributed after the intervention.

Table 5*Normality Tests Results of Five Variables*

	Kolmogorov-Smirnova		Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.
Pre TE	0.181	40	0.002	0.931	40	0.017
Pre communication	0.163	40	0.009	0.929	40	0.015
Pre innovation	0.184	40	0.002	0.931	40	0.018
Pre incentive	0.149	40	0.025	0.953	40	0.094
Post LS	0.197	40	0	0.921	40	0.008
Post TE	0.118	40	0.171	0.943	40	0.042

	Kolmogorov-Smirnova		Shapiro-Wilk		df	Sig.
	Statistic	df	Sig.	Statistic		
Post communication	0.221	40	0	0.881	40	0.001
Post innovation	0.225	40	0	0.917	40	0.006
Post incentive	0.157	40	0.014	0.934	40	0.022
Post LS	0.19	40	0.001	0.934	40	0.023
a Lilliefors Significance Correction						

Therefore, the researcher adopted Wilcoxon signed-rank test to explore whether there's any significance after ODI. The Sig. values for all variables were less than 0.001, indicating that all comparisons had shown statistically significant differences at the conventional alpha level of 0.05. When evaluating effect size, the correlation coefficients referred to as *r* values for all five indicators were greater than 0.86. Among them, four variables had values as high as 0.875, while team effectiveness had a value of 0.864. It's also important to note the distribution of ranks. There were no negative ranks for any of the variables, and the number of positive ranks was 40 for four of the variables and 39 for team effectiveness. The number of positive ranks indicate that positive changes absolutely dominated in the paired comparisons. The findings from the Wilcoxon Signed-rank Test (see Table 6), have underscored the profound influence of the intervention across all measured dimensions. This research has experienced a marked difference, highlighting the ODI's broad-reaching and impactful nature on the various facets of performance and behavior under investigation.

Table 6

Wilcoxon Signed-rank Test Result

	Communication	Innovation	Incentive	Leadership Skills	Team Effectiveness
Asymp. Sig. (2-tailed)	0	0	0	0	0
<i>r</i>	0.875	0.875	0.875	0.874	0.864
Number of Negative Ranks	0	0	0	0	0
Number of Positive Ranks	40	40	40	40	39

Qualitative Data Analysis

In the pre-ODI stage, 12 students participated in the semi-structured interviews. Each student was required to answer these five questions in Table 3. The researcher and the other two teachers used thematic analysis to process the interview texts and formed five ODI preliminary qualitative data analysis tables of pre-ODI qualitative data analysis (see Table 7).

Table 7*Pre-ODI Qualitative Data Analysis*

Variables	Categories	Themes
Communication	Category 1: Using a single communication method, even when inappropriate Category 2: Overlooking the communication partner's traits or preferences Category 3: Occasionally interrupting or losing focus during conversations Category 4: Demonstrating lukewarm attention or subtle dismissiveness while listening Category 5: Occasionally misinterpreting or distorting messages Category 6: Seldom considering others' underlying intentions or needs Category 7: Rarely asking clarifying questions, leading to avoidable misunderstandings Category 8: Delaying feedback until it's too late to be meaningful	Theme 1: Inflexible communication approaches (Categories: 1, 2) Theme 2: Half-hearted listening (Categories: 3, 4) Theme 3: Communication as transactional, not relational (Categories: 5, 6, 7, 8)
Innovation	Category 1: Lack of innovation motivation Category 2: Limited interest and enthusiasm for innovation within the CSASTI Category 3: Initial exposure to innovative thinking methods Category 4: Basic familiarity with innovation tools and techniques Category 5: Limited practice and feedback on innovation methods Category 6: Designing and initiating innovation training plans Category 7: Initial efforts to enhance team collaboration through innovation activities	Theme 1: Low team enthusiasm for innovation (Category: 1, 2) Theme 2: Deficient ability to master and apply innovation methods (Category: 3, 4, 5) Theme 3: Inadequate training and collaboration support for innovation (Category: 6, 7)
Incentive	Category 1: Lack of mutual support among team members Category 2: Challenges in assessing the difficulty of team tasks Category 3: Inadequate strategies for handling challenging tasks Category 4: Ineffective current team incentive measures Category 5: Specific and actionable suggestions for incentive improvement Category 6: Expectations for the impact of improved incentives on team performance	Theme 1: Deficient mutual support within the team (Category: 1) Theme 2: Challenging team tasks with insufficient support (Category: 2, 3) Theme 3: Suboptimal team incentives requiring enhancement (Category: 4, 5, 6)
Leadership Skills	Category 1: Assessment of the current level of leadership skills Category 2: Identification of specific areas for leadership skills enhancement Category 3: Personal motivation and willingness to improve leadership skills Category 4: Strategies for obtaining guidance and support Category 5: Barriers to influencing others	Theme 1: Recognition of the need for leadership skills improvement (Category: 1, 2) Theme 2: Existence of improvement willingness and demand for guidance (Category: 3, 4)

Variables	Categories	Themes
		Theme 3: Low willingness to influence others' ideas (Category: 5)
Team Effectiveness	Category 1: Self-assessment of current team effectiveness Category 2: Identified strategies and methods for improving team performance Category 3: Evaluation of current team cohesion and collaboration Category 4: Approaches to enhancing team unity and collaboration Category 5: Understanding the importance and principles of setting effective team goals Category 6: Strategies for efficient task completion within the team	Theme 1: Team effectiveness perceived as suboptimal (Category: 1, 2) Theme 2: Room for improvement in team cohesion and collaboration (Category: 3, 4) Theme 3: Recognition of the importance of goal-setting for efficient task completion (Category: 5, 6)

Based on the results of the quantitative and qualitative analysis in pre-ODI stage, the following interventions were proposed (see Table 8).

- ♦ To improve communication by Fishbowl Conversation Workshop
- ♦ To improve innovation by Skills Training Workshop
- ♦ To improve incentive by Goal Setting Workshop
- ♦ To improve leadership skills by Appreciative Inquiry Workshop

Table 8

Corresponding interventions for the analysis of pre-ODI

Variable	Low-Mean Questionnaire Item (pre-ODI)	Mean Value	Corresponding to the Qualitative Analysis Outcomes	Intervention to Deal with this Problem
Communication	I am content with the accuracy of information interchange within the team.	2.42 Lowest mean	Theme 3: Communication as transactional, not relational (Categories: 5, 6, 7, 8)	Fishbowl Conversation Workshop
	Team members communicate clearly and adequately with each other.	2.85 Second Lowest Mean	Theme 1: Inflexible communication approaches (Categories: 1, 2)	
Innovation	When I have a new idea, I try to involve people who are able to collaborate on it.	2.4 Lowest mean	Theme 3: Inadequate training and collaboration support for innovation (Category: 6, 7)	Skills Training Workshop
	I try new ways of doing tasks for team.	3.02 Second Lowest Mean	Theme 2: Deficient ability to master and apply innovation methods (Category: 3, 4, 5)	
Incentive	Tasks in team are exciting and challenging.	2.62 Lowest mean	Theme 2: Challenging team tasks with insufficient support (Category: 2, 3)	Goal Setting Workshop

Variable	Low-Mean Questionnaire Item (pre-ODI)	Mean Value	Corresponding to the Qualitative Analysis Outcomes	Intervention to Deal with this Problem
	Sometimes, team members become so inspired by the work such that they forget everything else around them.	2.7 Second Lowest Mean	Theme 3: Suboptimal team incentives requiring enhancement (Category: 4, 5, 6)	
Leadership Skills	I seek many ways to receive feedback on how my participation and influence impact the performance of others.	2.42 Lowest mean	Theme 2: Existence of improvement willingness and demand for guidance (Category: 3, 4)	Appreciative Inquiry Workshop
	I talk to others about the values and principles that guide my decision and action when working in team.	2.88 Second Lowest Mean	Theme 1: Recognition of the need for leadership skills improvement (Category: 1, 2)	

After the ODIs, the same 12 students were invited to do the same interview again. The themes of the two interviews (see Table 9) confirmed that after undergoing ODI, students in CSASTI indeed experienced significant changes in their understanding of team effectiveness. These changes were manifested in multiple themes, particularly in their deeper understanding of communication, innovation, incentive, and leadership skills, which they were able to effectively apply and implement in their daily work and team collaboration. Students realized that efficient communication was the cornerstone of team collaboration, innovation was a crucial driving force for continuous team progress, and appropriate incentive and excellent leadership skills were key to enhancing overall team effectiveness.

Table 9

Theme of qualitative data before and after ODI

Variables	Themes in pre-ODI	Themes in post-ODI
Communication	● Inflexible communication approaches ● Half-hearted listening ● Communication as transactional, not relational	● Established effective communication methods adapted to contexts ● Communication was seen as a dynamic process involving transmission, comprehension, and reciprocation. ● Prioritized comprehension and reciprocation of others' intentions in communication
Innovation	● Low team enthusiasm for innovation ● Deficient ability to master and apply innovation methods ● Inadequate training and collaboration support for innovation	● Innovation was recognized as a core competency requiring continuous development ● Enhanced ability to apply and adapt innovation methodologies ● Implementation of systematic innovation training to foster habit of innovation

Variables	Themes in pre-ODI	Themes in post-ODI
Incentive	● Deficient mutual support within the team ● Challenging team tasks with insufficient support ● Suboptimal team incentives requiring enhancement	● Improved incentive equity and transparency to boost team morale ● Team member contributions are recognized and rewarded appropriately ● Incentives are aligned with team objectives to promote collaboration
Leadership Skills	● Recognition of the need for leadership skills improvement ● Existence of improvement willingness and demand for guidance ● Low willingness to influence others' ideas	● Significant improvement in leadership skills through training and practice ● Active pursuit of guidance for leadership growth ● Transformation in the willingness to influence others
Team Effectiveness	● Team effectiveness perceived as suboptimal ● Room for improvement in team cohesion and collaboration ● Recognition of the importance of goal-setting for efficient task completion	● Enhanced team effectiveness through cohesive strategies ● Aligning team goals with organizational objectives for better task completion and performance ● Fostering a positive work environment for improved team effectiveness

After the quantitative and qualitative analysis, significant changes are observed in the five variables of CSASTI (see Table 10). Firstly, in the area of communication (H1), the null hypothesis $H1_0$ is rejected, and the alternative hypothesis $H1a$ is accepted, indicating a significant impact of the ODI on communication, with a notable improvement in communication levels after the intervention. Secondly, in the domain of innovation (H2), a similar significant difference is observed, with $H2_0$ being rejected and $H2a$ confirmed, suggesting that the ODI effectively enhances the CSASTI's innovative capacity. Furthermore, regarding the incentive mechanisms (H3), $H3_0$ is found not to hold, and $H3a$ is supported, demonstrating that the ODI significantly improves the effectiveness of incentives. Additionally, in terms of leadership skills (H4), $H4_0$ is rejected and $H4a$ is accepted, proving that the ODI significantly enhances the leadership skills. Concerning team effectiveness (H5), $H5_0$ is rejected and $H5a$ is accepted, indicating that the ODI has a significant positive impact on team effectiveness. In summary, the ODI achieves significant results in multiple dimensions including communication, innovation, incentive, leadership skills and team effectiveness. These findings fully demonstrate the effectiveness of the ODI in promoting overall CSASTI's team effectiveness improvement.

Table 10*Hypotheses Testing Results*

List	Variables	Hypothesis contents	Result
H1	Communication	H1 ₀ : There is no significant difference between Pre ODI and Post ODI in communication. H1 _a : There is a significant difference between Pre ODI and Post ODI in communication.	H1 _a is accepted
H2	Innovation	H2 ₀ : There is no significant difference between Pre ODI and Post ODI in innovation. H2 _a : There is a significant difference between Pre ODI and Post ODI in innovation.	H2 _a is accepted
H3	Incentive	H3 ₀ : There is no significant difference between Pre ODI and Post ODI in incentive. H3 _a : There is a significant difference between Pre ODI and Post ODI in incentive.	H3 _a is accepted
H4	Leadership Skills	H4 ₀ : There is no significant difference between Pre ODI and Post ODI in leadership skills. H4 _a : There is a significant difference between Pre ODI and Post ODI in leadership skills.	H4 _a is accepted
H5	Team Effectiveness	H5 ₀ : There is no significant difference between Pre ODI and Post ODI in team effectiveness. H5 _a : There is a significant difference between Pre ODI and Post ODI in team effectiveness.	H5 _a is accepted

Conclusions and Discussion**Conclusions**

Within the specific context of team effectiveness of student association, the main findings reveal the pathways to improve it. The statistically significant improvements in communication, innovation, incentive and leadership skills validated by converging quantitative and qualitative data demonstrate that targeted ODIs can effectively overcome the limited situation. This shifts the paradigm from managing decline to proactively building resilient high performing student associations.

These findings hold significant implications. Theoretically it enriches team effectiveness by demonstrating their applicability and adaptation within the CSASTI proposing a validated framework of four key leverage points. Practically the study delivers a replicable blueprint a structured ODI program with specific workshops such as fishbowl conversation and appreciative inquiry that student associations like CSASTI can adopt. Especially for students, it enhances essential skills and personal development.

This research addresses a certain gap in existing studies by adopting a more systematic approach to exploring the challenges faced by student associations. It identifies and preliminarily validates the association between four core issues and overall team effectiveness, a connection that is often mentioned in the field but was lack of empirical cases. By designing implementing and rigorously evaluating a targeted intervention program based on this diagnosis, the study contributes to the understanding of in both understanding the operational

mechanism of team effectiveness in student associations and providing evidence based practical solutions.

Recommendations and Further Prospects

This study focuses on the team effectiveness of student associations in Chinese higher education, with a deep dive into the CSASTI. Despite its significant practical and academic value, there are still some limitations and something need further prospects.

Sample representativeness is a crucial limitation of this study. This research is confined to students in the CSASTI. This specific sample selection implies that the findings may not be broadly applicable to all student associations, such as those in primary and secondary schools or vocational colleges. Different types of student associations may exhibit significant differences in student association structure, cultural atmosphere, and member characteristics. These factors are precisely the key determinants affecting team effectiveness. For instance, students in primary and secondary schools are typically younger and less experienced, often focusing on foundational learning and exploring personal interests. In contrast, student associations in vocational colleges tend to be more specialized, with greater emphasis on practical skills and a certain level of professional knowledge. These disparities could lead to vastly different effects of team effectiveness improvement strategies among various types of student associations. For example, fostering foundational skills and personal interests may be more effective for students in primary and secondary schools, whereas vocational college students may benefit more from practical experiences and professional skill development to enhance team effectiveness. To enhance the representativeness and practicality of the findings, future research should build upon and refine the sampling methods employed in previous studies. This study only selected forty students from CSASTI as samples, which obviously suffers from a small sample size and considerable randomness, potentially leading to research results that are not sufficiently generalizable or insightful.

The intervention for CSASTI in this study lasted for three months, without further understanding or comparison of CSASTI's later development. If the research continues to track the team for a longer period, it will help the researcher observe how the team maintains and enhances its performance after undergoing changes, and whether strategies need to be adjusted at different stages. Longitudinal tracking can also reveal non-linear changes in the process of team performance enhancement, helping us better understand the dynamic process of team development. Through long-term tracking, the researcher can provide continuous strategic guidance to the team, ensuring that it maintains high performance throughout its continuous development.

Through this research, the researcher has preliminarily demonstrated the potential impact of ODIs on the team effectiveness of CSASTI. However, several limitations in the current study point to important directions for future research. Firstly, the limited sample size and narrow scope of participants, which was focused solely on CSASTI, highlight the need for

broader and more diverse sampling across various types of student associations. Secondly, the relatively short duration of the intervention limits the understanding of long-term effects on team performance; therefore, future studies should consider longitudinal designs to capture the evolving nature of team development. Finally, to enhance the applicability of the findings, cross-organizational comparative studies are recommended to explore how different organizational cultures and structures influence the effectiveness of performance enhancement strategies. By addressing these limitations, future research can provide more robust, nuanced, and actionable insights into improving team effectiveness in student associations across diverse educational contexts.

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