

# The Relationship Between Young Students' Attitudes Toward Collaboration and Team Satisfaction in a STEAM-based Program

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**Abstract:** Project teams have gained popularity recently as many companies increase the amount of work they require project teams to complete (Robbins & Judge, 2009). In order to address this need in the workforce, the educational institutions have incorporated more project team based learning into their curriculum (Parmelee & Hudes, 2012). Students, on the other hand, have shown a lack of interest towards team projects, are not always satisfied with their teamwork, and experience challenges in the process of collaborative work (Espey, 2010). Motivated by these facts, the purpose of this study is to shed some light on the relationship between team dynamics, team acquaintance, instructor support, and team satisfaction in a STEAM Enrichment program in a middle school formal classroom setting.

## Introduction

As our society moves forward, the ability for learners to work as part of a team and coordinate team efforts is becoming more critical for the advancement of knowledge and the success in any job (Johnson & Johnson, 2005). However, it is well-documented in the literature that students typically show lack of interest towards team projects and experience challenges in the process of collaborative work (Espey, 2010; Vance et al., 2015).

The scarcity of empirical studies looking into team satisfaction for K-12 students in a STEAM-based program led the researchers to conduct the current study. Specifically, researchers in this study investigated the relationship between team satisfaction and students' attitudes toward collaboration within a K-12 STEAM-based program context in a computer-supported collaborative learning environment. Students' attitudes toward collaboration were measured through three components: team dynamics, team acquaintance, and instructor support (Ku, Tseng, & Akarasriwon, 2013).

Team dynamics measures included participation, communication, collaboration, trust, and cohesion (Ku, Tseng, & Akarasriwon, 2013). Team acquaintance refers to students' familiarity with the team members and is found to be strongly associated with students' attitudes towards collaboration by earlier studies (Stark & Bierly, 2009). Specifically, students who are familiar with each other are reported to more easily form teams and set goals more quickly than others. The final component, instructor support, is another major driver in students' collaboration. In particular, surveyed students by earlier studies emphasized the need for instructor support especially in offering timely resources and providing opportunities to view examples, among others.

With this study, the researchers aimed to close the research gap in examining the relationship between team satisfaction and students' attitudes toward collaboration. More specifically, researchers sought to answer the following research question: what is the relationship between team satisfaction and students' attitude toward collaboration in a STEAM Enrichment Program?

## Framework

In this study, students were required to follow the engineering design process summarized in NASA's BEST engineering design model (REF). The engineering design process involves six steps: a) ask, b) imagine, c) plan, d) create, e) test and f) improve. While following these steps, students were also required to communicate with each other while doing research, brainstorming ideas, and refining the solutions to the chosen problem.

## Method: Participants, data collection, and instrument

Participants included 163 students in a STEAM Enrichment Program at a private middle school in Northern Georgia. The STEAM Enrichment Program was required for all students in grades 4<sup>th</sup> through 10<sup>th</sup> and was part of the weekly school schedule and the curriculum. Upon the completion of the STEAM Enrichment Program, an online student (adapted Ku, Tseng, and Akarasriwon's survey (2013)) survey was administered to evaluate the level of collaboration and assess satisfaction during the last week of school. The survey was employed to all students participating in the program using google forms, of whom 40% were female.

## Results

The three subscales of students' attitude towards collaboration (team dynamics, acquaintance, and instructor support) were correlated with each other, but the pairwise correlation coefficients were lower than 0.5, much smaller than the recommended cut-off of the value of 0.85 for distinguishing for an additional factor model (Kenny, 2012). This means the three considered factors were somewhat similar but distinct enough to separately explain variation in students' satisfaction (See Table 1).

In addition to correlation analysis, a multiple regression analysis was carried out to investigate whether students' attitude toward collaboration (as measured by team dynamics, team acquaintance, and instructor support) could significantly predict their team satisfaction. The results of the regression indicated that the model explained 35.1% of the variance and that the model explained a significant amount of variation at students' team satisfaction,  $F(3, 153) = 27.564, p < .001$ . While team dynamics ( $\beta = .740, p < .001$ ) and team acquaintance ( $\beta = -.447, p = .030$ ) contributed significantly to the model, instructor support did not ( $\beta = -.458, p = .074$ ).

**Table 1: Correlation between Team Satisfaction and Team Dynamics, Acquaintance, and Instructor Support**

	1	2	3	4	Mean	Std.	Cronbach's $\alpha$
1.Team Dynamics	-	.487**	.302**	.549**	44.18	9.11	.84
2.Team Acquaintance	-	-	.406**	.103	14.11	3.86	.78
3.Instructor Support	-	-	-	.003	11.6	2.81	.78
4.Team Satisfaction	-	-	-	-	38.84	10.03	.95

## Implementation and conclusions

Students' negative attitude toward teamwork and project teams is frequently discussed in education literature (Vance et al., 2015). However, the scarcity of empirical studies looking into the impact subfactors of students' attitude toward collaboration such team dynamics, acquaintance, and instructor support led the researchers to conduct the current study within a STEAM program context.

The findings of this study revealed that team dynamics had a positive association with students' team satisfaction. This result aligns with the relevant past literature which showed dynamics promoted higher teamwork satisfaction (Liu, Magjuka, & Lee, 2008). In addition, the regression analysis showed that team dynamics and acquaintance contributed significantly to the explanation of teamwork satisfaction and accounted for 35% of the variance. This finding is in line with previous studies showing that students acquainted with team members built good relationships with each other, resulting in higher team satisfaction (Ku, Tseng, & Akarasriwon, 2013; Stark & Bierly, 2009).

Since "establishing team commitment" is stated as an effective strategy for team dynamics and acquaintance in the literature, future research should explore ways to establish team commitment for K-12 students in a STEAM-based context. In an extension study, the researchers will explore the effects of increased flexibility in forming teams and assess the impact of this flexibility on team acquaintance and ultimately satisfaction.

## References

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