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Exploring Student Engagement, Individual Contribution, and Knowledge Sharing in Academic Research Teams: A Quantitative Study

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Abstract

This study investigates the interrelationships among student engagement, individual contribution, and knowledge sharing within academic research teams among fourth-year Marine Engineering students at the Philippine Merchant Marine Academy (PMMA). Employing a quantitative descriptive-correlational research design, data were collected from thirty (30) students using a validated researcher-made questionnaire. Descriptive statistics indicated very high levels of student engagement (M = 3.47), individual contribution (M = 3.41), and knowledge sharing (M = 3.48). Spearman's rho correlation analysis revealed statistically significant and strong positive correlations among the three variables, with the highest correlation observed between individual contribution and knowledge sharing (r = 0.950, p<0.01). These findings underscore the critical role of active engagement and individual accountability in fostering effective collaboration and knowledge exchange in research teams. The study recommends the implementation of structured support systems that recognize individual efforts, enhance motivation, and facilitate open communication to strengthen team dynamics in academic research settings.

Keywords: Individual contribution, Knowledge sharing, Research teams, Student engagement

Introduction

Student engagement, individual contribution, and knowledge sharing are pivotal factors influencing the effectiveness of academic research teams in higher education institutions such as PMMA. Engagement, defined as the behavioral, emotional, and cognitive investment in learning activities, has been shown to significantly impact academic achievement and collaborative outcomes (Hong, et al., 2020; Kahu, Stephens, Leach, & Zepke, 2020) [16, 19]. Research suggests that when students actively participate in research teams, they develop critical thinking, problemsolving skills, and a deeper understanding of their disciplines, which enhances both individual and collective performance (Pham, et al., 2024; Nast, et al., 2025)^[26, 25].

Moreover, individual contribution within research teams is closely linked to motivation and self-regulation, which foster sustained engagement and promote knowledge sharing among peers (De la Fuente *et al.*, 2017; Linnenbrink-Garcia *et al.*, 2018)^[8, 22]. Knowledge sharing, a cornerstone of successful teamwork, facilitates cognitive and social integration, enabling students to co-construct

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knowledge and improve research outcomes (Martínez *et al.*, 2019)^[23]. The dynamic interplay of these factors creates a supportive environment where students feel valued and empowered, thereby enhancing their academic experience and research productivity (Skinner *et al.*, 2020)^[28].

Despite the recognized importance of these constructs, quantitative studies exploring their relationships within academic research teams remain limited, particularly in contexts like PMMA. This study aims to fill this gap by quantitatively examining how student engagement, individual contribution, and knowledge sharing interact to influence team effectiveness in academic research settings, providing insights to optimize collaborative learning and research practices.

Integrated Literature and Studies

Student engagement is a multidimensional construct encompassing emotional, behavioral, cognitive, and academic dimensions that influence learning outcomes in academic settings (Chaka & Nkhobo, 2019)^[5]. Studies leveraging digital platforms such as MS Teams highlight that engagement is dynamic and context-dependent. mediated by communication features like posts and reactions that reflect participation levels (Hewson & Chung, 2021) ^[15]. Team-based learning (TBL) research further elucidates that engagement involves psychological states accountability, characterized bv communication. preparation, and teamwork, which foster collaborative discourse and enhance individual and collective learning (Smith et al., 2022) ^[29]. Engagement components can be categorized as relate (social connection and trust), create (knowledge construction), and donate (sharing and contributing), with the relate component being most prominent in team settings.

Accurately assessing individual contributions in academic teams requires multidimensional evaluation beyond mere participation counts. Li and Liu (2021) ^[21] propose four dimensions: knowledge input (ideas and problem-solving), organizational roles (task management), emotional support (motivation and atmosphere), and achievement (workload and output quality). Quantitative surveys often reveal disparities in workload distribution despite equal verbal participation, underscoring the necessity for structured metrics that capture both qualitative and quantitative contributions.

Knowledge sharing within academic teams is facilitated by social capital, where trust and strong interpersonal ties significantly enhance the exchange of information and collaborative problem-solving (Díez-Palomar & García-Carrión, 2019)^[9]. Empirical evidence indicates that trust mediates about one-third of the effect of social ties on knowledge sharing, which in turn positively impacts team performance (Zhang *et al.*, 2023)^[32]. Recognition of contributors elevates their social status, creating positive feedback loops that encourage further sharing.

Most research on student engagement employs quantitative survey methods, including self-reports, module login data, and performance metrics (Chaka & Nkhobo, 2019)^[5]. Mixed-method approaches and case study designs are also used to capture the complexity of engagement in real-world contexts. Clear methodological transparency regarding sample size, intervention nature, and data analysis enhances the validity and transferability of findings (QAA, 2021)^[27].

Theoretical and Conceptual Framework

Student engagement refers to the multifaceted involvement of learners in academic tasks, incorporating cognitive, emotional, and behavioral dimensions that collectively shape learning success. It includes students' effort, motivation, and active involvement in academic activities (Mercer & Dörnyei, 2020; Amerstorfer, 2021)^[24, 1]. Factors such as well-structured courses, strong instructor presence, significantly promote meaningful interactions and engagement and contribute to both student satisfaction and perceived academic success (Eom et al., 2006; DiLoreto & Gray, 2015)^[11, 10]. Pedagogical methods like problem-based and team-based learning foster learner autonomy and collaboration by enabling goal-setting and interdependent teamwork (Amerstorfer, 2021; Jakobsen & Knetemann, 2017) [1, 18].

The effectiveness of academic teams heavily relies on the individual contributions of their members. Rooted in social learning theory, individual learning and behavior are shaped through observation and interaction within a social context (Bandura, 1986) ^[2]. Students who actively engage in acquiring and sharing knowledge-before, during, and after class-enhance both their personal understanding and the collective performance of their team (Huang & Lin, 2017; Gomez, Wu, & Passerini, 2010) ^[17, 14]. When team members perceive each other's efforts as valuable, trust is strengthened and team outcomes improve (Balan, Clark, & Restall, 2015) ^[3].

Knowledge sharing is central to effective team functioning, as it enables the exchange of information, competencies, and experiences among members, thereby fostering innovation and collective learning (Blau, 1964; Huang & Lin, 2017) ^[4, 17]. Social exchange theory highlights that reciprocal and interdependent relationships encourage individuals to share knowledge, especially when their efforts are recognized and appreciated by peers (Blau, 1964; Frontiers in Psychology, 2023) ^[4, 13]. Both structured and informal knowledge-sharing practices within academic institutions support student success and boost satisfaction levels (SSRN, 2017) ^[30].

This conceptual framework integrates the above theories to explore the interplay among student engagement, individual input, and collaborative knowledge exchange within academic research teams. Engagement energizes participation and motivation; individual contributions supply substantive insights to group activities; and knowledge sharing ensures that learning is distributed and amplified. Drawing from social learning and social exchange theories, the framework explains how team dynamics and contextual elements influence academic collaboration and student development.



Fig 1: Paradigm of the Study

The conceptual framework for this study outlines the connections among the independent, dependent, and a possible mediating variable. Student engagement and individual contribution are identified as the independent variables, both expected to have a direct impact on the dependent variable-knowledge sharing within academic research teams. The framework also considers the role of a mediating variable, such as team cohesion or communication quality, which may help explain how engagement and contribution influence knowledge sharing. International Journal of Advance Research in Multidisciplinary

In this setup, the mediating variable is shaped by the independent variables and, in turn, affects the dependent variable. This approach allows for the examination of both direct and indirect effects, offering a deeper understanding of how these factors interact to influence knowledge sharing in academic research team settings.

Statement of the Problem

The main objective of the study is to examine the levels and interrelationships among key factors that influence the dynamics and success of student-led research or project teams. Specifically, it sought to answer the following questions:

- 1. What is the level of student engagement in research/project teams as perceived by the respondents?
- 2. What is the level of individual contribution of students in their respective research/project teams?
- 3. How do students perceive knowledge sharing and socio-cognitive dynamics within their research/project teams?
- 4. Is there a significant relationship between student engagement, individual contribution and knowledge sharing in academic research teams?

Definition of Terms

Student engagement: How actively and genuinely involved students are in their research or project teams. It's about showing interest, putting in effort, staying motivated, and being mentally and emotionally present during team activities.

Individual contribution: What each student personally brings to the team. This could be through sharing ideas, completing tasks, helping solve problems, or taking responsibility to support the group's goals.

Knowledge sharing: Happens when students openly exchange what they know with their teammates-like information, skills, or tips-to help each other learn and succeed in the project. It's about learning together and lifting each other up.

Socio-cognitive dynamics: Refer to how students interact and think together in a group. It includes things like communication, teamwork, building trust, and solving problems as a team-not just individually.

Academic research: These are groups of students working together on school-related research or projects.

Materials and Methods Research Design

This study adopted a quantitative descriptive-correlational research design to gain insights into how students engage, contribute individually, and share knowledge within academic research teams. The descriptive aspect focused on identifying how students perceive their own levels of participation, contribution, and collaboration. The correlational part explored the relationships between student engagement, individual contribution, and knowledge sharing. This design is suitable for identifying patterns and determining whether meaningful associations exist among variables without manipulating them (Creswell & Creswell, 2018)^[7]. By using this approach, the study aims to offer a clearer understanding of the dynamics that support effective teamwork in academic research environments.

Participants

The respondents of the study were thirty (30) 1cl students (fourth year) from the College of Marine Engineering at the Philippine Merchant Marine Academy. They have already completed their thesis final defense and need to submit a bound hard copy as part of their graduation requirements.

Ethical Considerations

The research was conducted in a fair, truthful, and transparent manner. The profiles of the respondents were treated with confidentiality and used solely for research purposes. Most importantly, all relevant literature, studies, and references were properly acknowledged and credited.

Instrumentation

The primary instrument used in this study is a researchermade questionnaire consisting of two parts. Part I gathers data on the demographic profile of Fourth Year (1CL) cadets. Part II utilizes a four-point Likert scale designed to assess cadets' perceptions of the interrelationship between student engagement, individual contribution, and knowledge sharing, as well as the socio-cognitive factors that influence collaborative learning experiences.

Procedure

The data collection process began with the determination of the study's inputs. After validating the questionnaires, the researcher, encoded on the google forms the survey questionnaire. For the data collection phase, the researcher send the survey to the target audience and collected the results.

Results and Discussion

Level of Student Engagement in Research/Project Teams: Table 1 shows the level of engagement of respondents in research/project teams as perceived by the respondents.

Table 1: Level of Student Engagement in Research/Project Teams

Statements	Weighted Mean SI		Verbal Interpretation	
I am enthusiastic about the goals of our project team.	3.44	0.50	Very High Engagement	
I actively participate in group discussions and planning.	3.56	0.50	Very High Engagement	
I take initiative in tasks without being told.	3.44	0.50	Very High Engagement	
I consistently attend and contribute to team meetings.	3.44	0.50	Very High Engagement	
I stay focused and motivated even during challenges in the project.	3.44	0.50	Very High Engagement Very High Engagement	
Over-all	3.47	0.50		

The data in Table 1 show that respondents perceived their level of engagement in research or project teams as very high across all indicators. The overall weighted mean of International Journal of Advance Research in Multidisciplinary

3.47 with a standard deviation of 0.50 indicates a strong and consistent perception of active involvement and motivation within the teams. The highest-rated statement was "I actively participate in group discussions and planning" with a mean of 3.56, suggesting that respondents are highly engaged in the collaborative aspects of research work. This was followed closely by four statements-enthusiasm about team goals, taking initiative, consistent attendance at meetings, and staying motivated during challenges-each with a mean score of 3.44. These results indicate that students not only contribute ideas but also demonstrate initiative, regular participation, and resilience in the face of challenges. The consistent standard deviation across all items suggests that the perceptions of engagement were uniform among the respondents. Overall, the findings reflect a high level of commitment and active participation in their respective research or project teams, consistent with previous research that highlights the importance of student engagement in promoting successful team collaboration and academic performance (Fredricks et al., 2016)^[12].

Level of Individual Contribution in Research/Project Teams

Table 2 shows the level of individual contribution in research/project teams as perceived by the respondents.

 Table 2: Level of Individual Contribution in Research/Project

 Teams

Statements	Weighted Mean	SD	Verbal Interpretation	
I completed my assigned tasks on time and with quality.	3.33	0.47	Very High Contribution	
My contribution was crucial to the progress of our project	3.44	0.50	Very High Contribution	
I supported team members when they needed help.	3.44	0.50	Very High Contribution Very High Contribution Very High Contribution Very High Contribution	
I showed leadership in specific phases of the project.	3.39	0.49		
I shared ideas that helped improve our research output.	3.44	0.50		
Over-all	3.41	0.47		

Table 2 presents the respondents' perceived level of individual contribution within their respective research or project teams. The overall weighted mean of 3.41 with a standard deviation of 0.47 indicates a very high level of individual contribution among the participants. Among the specific indicators, the statements "My contribution was crucial to the progress of our project," "I supported team members when they needed help," and "I shared ideas that helped improve our research output" received the highest mean scores of 3.44, each classified as very high. These results suggest that respondents strongly believe their efforts had a significant impact on the success and progress of their teams. The statement "I showed leadership in specific phases of the project" received a slightly lower mean of 3.39, while "I completed my assigned tasks on time and with quality" received a mean of 3.33-both still within the very high contribution range. This indicates a consistently strong perception of accountability, timeliness, and leadership across tasks. The relatively low standard deviations for all statements (ranging from 0.47 to 0.50) imply consistent responses among participants, reinforcing the overall finding of a cohesive and productive individual effort within research teams. These findings align with prior research highlighting the importance of individual accountability, leadership, and collaborative behavior in group-based academic work (Wang *et al.*, 2017)^[31].

Level on Knowledge Sharing and Socio-cognitive Dynamics in Research/Project Teams: Table 3 shows the level on knowledge sharing and socio-cognitive dynamics in research/project teams as perceived by the respondents.

 Table 3: Level on Knowledge Sharing and Sociocognitive

 Dynamics in Research/Project Teams

Statements	Weighted Mean	SD	Verbal Interpretation
Our team encouraged open communication of ideas and opinions	3.44	0.50	Extensive collaboration
I trust my teammates to handle their responsibilities.	3.44	0.50	Extensive collaboration
I learned new concepts or skills from my teammates	3.44	0.50	Extensive collaboration
Our team resolved conflicts in a constructive manner.	3.50	0.50	Extensive collaboration
We combined our individual strengths to produce innovative outcomes.	3.56	0.50	Extensive collaboration
Over-all	3.48	0.50	Extensive collaboration

Table 3 presents the respondents' perceptions of knowledge sharing and socio-cognitive dynamics within their research or project teams. The overall weighted mean of 3.48 with a standard deviation of 0.50 indicates a high level of extensive collaboration among the participants. The statement "We combined our individual strengths to produce innovative outcomes" received the highest weighted mean of 3.56, suggesting that the teams were effective in leveraging diverse skills and perspectives to enhance their research outputs. This reflects a strong culture of synergy and creative problem-solving. Following closely, "Our team resolved conflicts in a constructive manner" received a mean of 3.50, highlighting the team's ability to manage interpersonal challenges effectively. The other three indicators-encouraging open communication, trust in teammates, and learning from peers-each received a weighted mean of 3.44, still within the same category of extensive collaboration. These results imply that trust, mutual learning, and open dialogue are consistently present within the respondents' teams. The uniformity of responses, as indicated by the consistent standard deviation of 0.50, suggests strong agreement among respondents regarding the collaborative nature of their team experiences. Overall, the data reveals that the respondents perceived a highly cooperative and intellectually enriching environment within their research/project teams, consistent with prior studies emphasizing the role of socio-cognitive processes, trust, and open communication in fostering innovation and effective teamwork (Chiu et al., 2006)^[6].

Significant Relationship Between Student Engagement, Individual Contribution and Knowledge Sharing Table 4 shows the result of significant relationship between

student engagement, individual contribution and knowledge sharing in research/project teams using SPSS.

Table 4: Summary of Results on Significant Relationship

Correlations							
			Engagement	Contribution	Sharing		
Engagement Spearman's rho Contribution Sharing	Engagement	Correlation Coefficient	1.000	.848**	.819**		
		Sig. (2-tailed)		.000	.000		
		Ν	36	36	36		
		Correlation Coefficient	.848**	1.000	.950**		
	Contribution	Sig. (2-tailed)	.000	•	.000		
		Ν	36	36	36		
	Sharing	Correlation Coefficient	.819**	.950**	1.000		
		Sig. (2-tailed)	.000	.000			
		N	36	36	36		

**. Correlation is significant at the 0.01 level (2-tailed).

The results presented in Table 4 demonstrate the existence of significant and strong positive relationships among student engagement, individual contribution, and knowledge sharing within research or project teams, based on Spearman's rho correlation analysis. Specifically, the correlation coefficient between student engagement and individual contribution was found to be 0.848, indicating a very strong and statistically significant relationship. This means that students who are more engaged in their team activities also tend to contribute more meaningfully to the progress and output of the project.

Furthermore, the relationship between student engagement and knowledge sharing was also strong, with a correlation coefficient of 0.819. This suggests that students who exhibit higher levels of enthusiasm, initiative, and participation are also more likely to engage in open communication, collaborative problem-solving, and mutual learning with their peers. The strongest relationship was observed between individual contribution and knowledge sharing, with a coefficient of 0.950, signifying a near-perfect correlation. This result implies that students who consistently fulfill their tasks and take on leadership roles are also those who foster collaborative dynamics and enrich the team's knowledge base. These findings are consistent with earlier research emphasizing that engaged learners are more likely to participate in knowledge sharing and collaborative learning processes that enhance team productivity (Lee, Cheng, & Hsu, 2021)^[20].

All correlation values were significant at the 0.01 level (2tailed), confirming that the relationships are not due to chance. Overall, the findings underscore the importance of fostering student engagement as a foundational factor that supports active contribution and effective knowledge sharing in academic teamwork environments.

Conclusion

The findings of this study lead to several key conclusions about the dynamics of academic research and project teams among students:

1. High Student Engagement: Respondents reported a very high level of engagement in their research teams. This was reflected in consistent participation in discussions, motivation to achieve team goals, regular attendance, and perseverance during challenges. These

results affirm that engaged students are highly involved in collaborative learning environments, which is crucial for team success.

- 2. Strong Individual Contribution: Students perceived their individual contributions as highly significant to their teams. They believed their roles were essential to the progress of the project, especially in offering ideas, helping others, completing tasks with quality, and even taking leadership roles. This indicates a strong sense of responsibility and ownership among participants.
- 3. Effective Knowledge Sharing and Socio-Cognitive Dynamics: The respondents demonstrated a high level of knowledge sharing, open communication, and collaboration within their teams. Indicators such as innovation through teamwork, conflict resolution, trust, and mutual learning were all rated highly, showing that positive socio-cognitive dynamics are present and nurtured.
- 4. Significant Positive Relationships: Statistical analysis revealed strong and significant correlations between student engagement, individual contribution, and knowledge sharing. Notably, individual contribution had the strongest correlation with knowledge sharing. This means that students who actively contribute are also more likely to foster a collaborative learning environment.

Overall Conclusion

The study concludes that student engagement and individual contribution are not only high among student research teams but are also key predictors of effective knowledge sharing. Fostering these elements can significantly improve team collaboration, innovation, and overall academic performance. These findings support educational practices that encourage active student involvement, personal accountability, and open, trust-based communication within collaborative learning environments.

Recommendation

Based on the findings and conclusions of this study, the following recommendations are proposed to enhance student engagement, individual contribution, and knowledge sharing in academic research or project teams:

1. Promote Active Engagement Strategies: Instructors

and academic institutions should design research/project activities that encourage active student participation. Strategies such as collaborative planning sessions, regular team check-ins, and reflective exercises can help sustain motivation and engagement throughout the project.

- 2. Foster a Culture of Accountability and Initiative: Assigning clear roles and responsibilities to each team member can enhance individual accountability. Encouraging students to take initiative-such as leading specific phases of the project-can help reinforce their sense of ownership and personal contribution to the team's success.
- **3. Enhance Knowledge Sharing Through Structured Interaction:** Integrate structured knowledge-sharing practices, such as peer review, group reflections, and collaborative problem-solving activities, to promote a culture of open communication and mutual learning. Faculty can facilitate these interactions by modeling effective communication and teamwork behaviors.
- 4. Train Students in Teamwork and Communication Skills: Workshops or short modules on conflict resolution, active listening, and effective collaboration can improve socio-cognitive dynamics within teams. These skills help build trust and ensure that diverse perspectives are valued and integrated into the team's output.
- 5. Utilize Digital Tools to Support Collaboration: Encourage the use of collaborative platforms such as Google Workspace, Microsoft Teams, or project management apps to organize tasks, track contributions, and facilitate ongoing communication among team members.
- 6. Incorporate Engagement and Contribution Metrics in Evaluation: Project assessments should not only evaluate the final output but also consider levels of participation, collaboration, and contribution. Rubrics can include criteria related to team dynamics and individual input to promote fairness and transparency.
- 7. Encourage Faculty Mentorship: Faculty members should provide regular guidance and feedback to research/project teams to sustain engagement and ensure effective knowledge exchange. Mentorship fosters a supportive environment where students feel encouraged to contribute and grow.

By implementing these recommendations, educational institutions can create a more engaging and collaborative academic environment that empowers students to actively participate, contribute meaningfully, and share knowledge effectively within their research and project teams.

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