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Impact of Collaborative Learning in Shaping Industrial Technology Students' Skills and Competencies at Aurora State College of Technology

Pascua, Jaycile C.[1]*, Cortez, Mark Harvin R.[2], Manliguez, Debbie U. [3]

[1] *Benguet State University, La Trinidad Benguet, 2601, Philippines*
[2] *Aurora State College of Technology, Brgy. Zabali Baler, Aurora 3200, Philippines*
*Corresponding author's email:pascuajaycile1400@gmail.com

Abstract. This study investigates the influence of collaborative learning on the development of essential skills, competencies, and professional and technical abilities of Industrial Technology students. Using a self-constructed questionnaire, data were gathered to assess students' perceptions of how collaborative learning contributes to their academic and professional growth. Results show that students strongly agree on the positive impact of collaborative learning across three dimensions: skills development (mean = 3.48), competency enhancement (mean = 3.40), and the shaping of professional and technical skills (mean = 3.41).

The findings highlight that collaborative learning promotes problem-solving abilities, facilitates the application of classroom knowledge, and makes the learning process more engaging and effective. Students' also builds confidence in performing technical tasks and accelerates learning through peer interaction. Furthermore, students recognize that collaborative learning enhances communication, leadership, time management, and critical thinking skills, while also fostering adaptability and flexibility—traits vital for both academic achievement and workplace success. In-terms of professional readiness, collaborative learning fosters accountability, teamwork, and exposure to diverse perspectives, equipping students with the competencies required in industry settings.

In general, the study highlights the significance of incorporating collaborative learning strategies into technical education to ensure development and career readiness among students.

Keywords: Impact of Collaborative; Shaping Industrial Technology Students; Skills and Competencies; Collaborative Learning

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1. Introduction

In the current time of rapid technological innovation, industries require a workforce that is not only technically proficient but also adaptable, inventive, and collaborative. They must be able to come up with ideas and work well with others. The Bachelor of Industrial Technology degree at Aurora State College of Technology (ASCOT) teaches students the practical skills they need to get a job in industry.

The thing about industry is that it is always changing. This means that the old way of learning might not be the way to prepare students for the real world. That is why it is an idea for students to learn together and share ideas. This helps them get better at what they do and learn skills. The Bachelor of Industrial Technology degree is really, about giving students the skills they need to succeed in industry. Students engage in collaborative learning through practical experiences, information sharing, problem-solving techniques, and group-based activities. This approach develops leadership, communication, teamwork, and critical thinking—all of which are vital in the industrial workforce. Students study technical topics more thoroughly, improve their problem-solving skills, and cultivate a sense of responsibility and teamwork through collaborative learning experiences—all of which are highly regarded in contemporary industrial environments.

This study examines how collaborative learning affects students' skill and competency development, a quantitative research methodology. This study attempts to show and explains how teamwork shapes the technical and professional skills of ASCOT industrial technology students by examining real-world learning experiences.

2. Methodology

Data Collection Procedure

Before collecting data, the researcher developed a self-made questionnaire designed to assess the effectiveness of collaborative learning among Industrial Technology students at the School of Industrial Technology, Aurora State College of Technology (ASCOT) in Baler, Aurora. The questionnaire underwent validity testing to establish its content validity and reliability testing to determine the consistency of the instrument (Creswell & Creswell, 2018). To facilitate the study, the researcher carefully selected the school and participants as the study's locale.

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Prior to distributing the research instruments, formal permission letters were prepared and submitted to the appropriate office heads and school administrators for approval.

Once permission was granted, the researcher personally approached the respondents, clearly explained the purpose of the study, and emphasized the importance of providing truthful and accurate responses. Before data collection began, the researcher obtained informed consent from all respondents. Each participant was informed of the purpose of the study, the procedures involved, and their right to participate voluntarily or withdraw from the study at any time without penalty. The respondents were also assured that the information they provided would be treated with strict confidentiality and used solely for academic and research purposes in accordance with the ethical principles outlined by the American Psychological Association (American Psychological Association [APA], 2020).

After all the completed questionnaires had been collected, the researcher reviewed the responses for completeness, organized and encoded the data, and prepared them for statistical analysis following the recommended procedures for quantitative research (Creswell & Creswell, 2018).

Data Analysis Techniques

1. To assess the effectiveness of collaborative learning among Industrial Technology students at Aurora State College of Technology (ASCOT), the researcher utilized a self-made questionnaire as the primary data collection instrument (Creswell & Creswell, 2018). The gathered responses were analyzed to determine the perceived impact and effectiveness of collaborative learning in enhancing students' skills and competencies using appropriate statistical techniques (Fraenkel et al., 2019; Creswell & Creswell, 2018).

2. The researcher employs Slovin's formula to determine the appropriate sample size needed to achieve a desired confidence level when sampling the population. This formula is particularly useful when there is limited information about the population's characteristics or behaviour, making it an effective method for estimating an adequate sample size for the study (Online Sample Size Calculator: Slovin's Formula Calculator, n.d.).

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3. To interpret the data on the assessment of Industrial Technology students at Aurora State College of Technology (ASCOT) regarding the effectiveness of collaborative learning, the researcher employed the weighted mean as the primary statistical tool. This method was used to analyze and determine the overall level of effectiveness based on the students' responses to the questionnaire (Chen & Liu, 2020; León-Mantero et al., 2020).

The effectiveness of collaborative learning among Industrial Technology students was evaluated using the weighted mean. The resulting weighted mean values were interpreted according to the following four-point Likert scale.

Table 1: *Scoring guide for the quality of the Impact of collaborative learning in shaping industrial technology students' skills and competencies of Aurora State College of Technology*

Range	Verbal Interpretation
3.25 – 4.00	Strongly Agree
2.50 – 3.24	Agree
1.75 – 2.49	Disagree
1.00 – 1.74	Strongly Disagree

3. Results and Discussion

Based on the data gathered and in accordance with Slovin's formula, a representative sample of 450 students was determined from the total population of 1,618 Industrial Technology students at Aurora State College of Technology (ASCOT) to ensure reliable and representative results. Slovin's formula is commonly used to determine the minimum sample size when the population size is known and the desired margin of error has been specified (Mburu, 2026).

Table 2: Percentage of Courses

Percentage	Number	Verbal Interpretation
34.4%	155	Automotive Engineering Technology

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14.4%	65	Civil Engineering Technology
28.2%	127	Electrical Engineering Technology
22.9%	103	Food Technology

The table shows that most respondents (34.4% or 155 students) are from Automotive Engineering Technology, followed by Electrical Engineering Technology with (28.2% or 127 students), Food Technology (22.9% or 103 students), and Civil Engineering Technology with the fewest at (14.4% or 65 students).

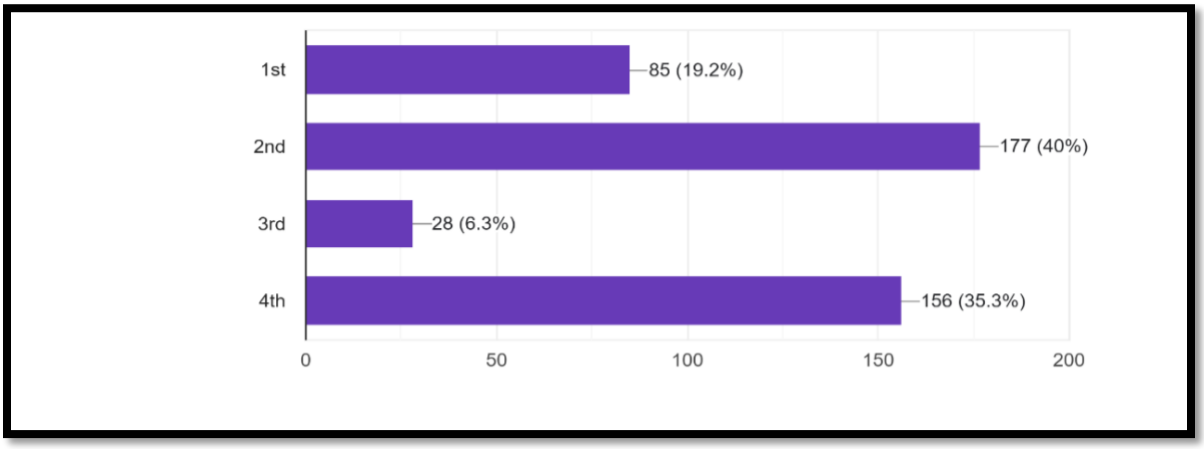

Figure 1: Bar chart of respondents

The bar chart shows that the most popular ranking was 2nd year students of industrial technology with 40% of responses, followed by 4th year students is 35.3%, 1st year is 19.2%, and 3rd year students answered the survey questionnaire with the least responses at 6.3%.

Table 3: *Influence of Collaborative Learning on Skills Development*

Indicators	Mean	Verbal Interpretation
Question 1 Collaborative learning enhances my technical problem-solving skills	3.52	Strongly Agree
Question 2	3.46	Strongly Agree

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Working in groups improves my ability to apply classroom concepts in practical tasks		
Question 3		
Teamwork makes learning more engaging and effective.	3.56	Strongly Agree
Question 4		
Collaboration strengthens my confidence in performing technical tasks.	3.57	Strongly Agree
Question 5		
I learn faster and better when working with peers compared to working alone.	3.42	Strongly Agree
Influence of Collaborative Learning on Skills Development	**3.48**	**Strongly Agree**

Students **strongly agree** that collaborative learning positively influences their skill development. Specifically, they believe it enhances their technical problem-solving skills, helps them apply classroom concepts in practical tasks, makes learning more engaging and effective, boosts confidence in performing technical tasks, and enables them to learn faster and better when working with peers. The overall mean score of **3.48** confirms a strong positive perception of collaborative learning's impact on skill development.

Table 4: *Competencies Enhanced Through Collaborative Learning*

Indicators	Mean	Verbal Interpretation
Question 1		
Group activities help me develop strong communication skills.	3.48	Strongly Agree
Question 2		
I gain leadership experience through collaborative learning.	3.34	Strongly Agree
Question 3		

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Working in teams improves my time management and organizational skills.	3.42	Strongly Agree
Question 4		
Collaborative learning builds my decision-making and critical thinking ability.	3.39	Strongly Agree
Question 5		
I become more adaptable and flexible through group work.	3.38	Strongly Agree
Competencies Enhanced Through Collaborative Learning	**3.40**	**Strongly Agree**

The data shows that students **strongly agree** that collaborative learning enhances various competencies. They believe that **group activities help develop communication skills (3.48)**, provide **leadership experience (3.34)**, improve **time management and organizational skills (3.42)**, strengthen **decision-making and critical thinking (3.39)**, and increase **adaptability and flexibility (3.38)**. The overall mean of **3.40** indicates a strong positive perception of the competencies gained through collaborative learning.

Table 5: *Processes Through Which Collaborative Learning Shapes Professional and Technical Skills*

Indicators	Mean	Verbal Interpretation
Question 1		
Peer feedback during group work improves my technical performance.	3.36	Strongly Agree
Question 2		
Collaborative learning teaches me accountability and responsibility.	3.39	Strongly Agree
Question 3		
Teamwork prepares me for real-world workplace collaboration.	3.44	Strongly Agree
Question 4	3.32	

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Group discussions expose me to diverse perspectives and new ideas.		Strongly Agree
Question 5		
Collaboration helps me develop both professional behavior and technical expertise.	3.45	Strongly Agree
Processes Through Which Collaborative Learning Shapes Professional and Technical Skills	**3.41**	**Strongly Agree**

The results indicate that students **strongly agree** that collaborative learning helps shape their professional and technical skills. They believe that peer feedback improves technical performance **(3.36),** collaborative learning builds accountability and responsibility (3.39), and teamwork prepares them for real-world workplace collaboration (3.44). Additionally, group discussions introduce diverse perspectives and new ideas (3.32), and collaboration supports the development of both professional behavior and technical expertise (3.45). The overall mean of 3.41 reflects a strong agreement that these processes effectively contribute to their growth.

Table 6: Summary of Findings

Indicators	Mean	Verbal Interpretation
- Influence of Collaborative Learning on Skills Development	3.48	Strongly Agree
- Competencies Enhanced Through Collaborative Learning	3.40	Strongly Agree
- Processes Through Which Collaborative Learning Shapes Professional and Technical Skills	3.41	Strongly Agree

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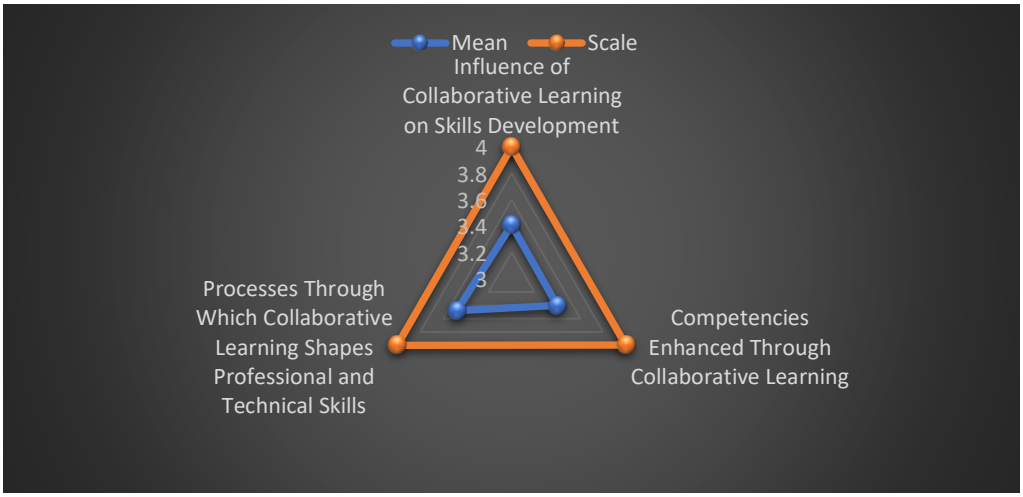

Figure 2: *Radar Chart for image representation of the result*

A radar chart displays multivariate data stacked at an axis with the same central point. The chart features three or more quantitative variables for comparison; these variables are known as radii. The map looks similar to the spider web, which is why it's also called a spider chart (jaspersoft.com 2024).

The radar show the summary of result that collaborative learning strongly contributes to the development of skills (mean = *3.48*, 🔵 blue line), enhancement of competencies (mean = *3.40*, 🔵 blue line), and shaping of professional and technical abilities (mean = *3.41*, 🔵 blue line), as reflected in the high ratings compared to the maximum scale (🔴 red line, 4.0).

4. Conclusions

1. The findings reveal that students strongly agree on the positive impact of collaborative learning in developing essential skills. With an overall mean of 3.48, the results indicate that collaborative learning significantly contributes to enhancing technical problem-solving abilities, improving the application of classroom knowledge, making learning more engaging and effective, building confidence in technical tasks, and promoting faster and more effective learning through peer interaction.

2. The data indicates that students strongly agree that collaborative learning significantly enhances a range of essential competencies. With a mean score of 3.40, students acknowledge that working in groups helps them develop strong communication skills, gain leadership experience, improve time management and organizational abilities, and strengthen critical-

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thinking and decision-making skills. Additionally, Collaborative learning is really good for students because it helps them learn to adapt to things and be flexible. These are important skills for students to have not just for school but also for when they have a job. That is why it is an idea to use collaborative learning strategies in the classroom so students can develop these skills and become better students. Collaborative learning is very important, for the success of students.

3. The students really think that working together in class is very important for getting better at their jobs and learning skills. They gave it a score of 3.41, which's high. The students believe that getting feedback from their friends helps them do a job, and working together makes them more responsible and accountable. Collaborative learning helps students learn things, and collaborative learning makes them better at their jobs. The students like learning because it helps them, and collaborative learning is good for them.

Recommendation

1. The school of industrial technology at Aurora State College of Technology is encouraged to strengthen the use of collaborative learning techniques/strategies in teaching, as findings show that it has a significant influence on students' skills development. Faculty members may integrate more group-based activities, problem-solving tasks, and peer-to-peer learning to enhance both technical and interpersonal competencies of students.
2. Competencies are significantly enhanced through collaborative learning, the School of Industrial Technology at Aurora State College of Technology should continue to promote and integrate collaborative activities and task in the curriculum. Encouraging teamwork, peer discussions, and group projects will further strengthen students' competencies and prepare them for industry-related demands.

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