Enhancing Technical Proficiency Skills of Information Technology Students through Peer Mentoring at St. Mary's College of Meycauayan

Michael Botis

IT Program Adviser/Research Coordinator St. Mary's College of Meycauayan, Inc.

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ABSTRACT

This study aimed to evaluate the effectiveness of a peer mentoring program in improving the technical skills of IT students at St. Mary's College of Meycauayan, Inc. The research utilized a descriptive design, combining quantitative and qualitative data through surveys and thematic analysis. Results revealed that first-year and third-year students were the most engaged in the peer mentoring sessions, with Session C being the most popular. Participants reported significant improvements in their technical skills, especially in areas such as development and design, problem-solving, and project management. Notably, there was a moderate positive correlation between the peer mentoring strategy and student grades, indicating that the program positively impacted academic performance. The study concluded that peer mentoring effectively enhances IT students' technical competencies and promotes collaborative learning, which builds confidence in applying skills to real-world scenarios. Furthermore, the peer mentoring sessions highlighted the importance of interactive, hands-on learning experiences. The research recommends formalizing peer mentoring within the curriculum, incorporating peer-led activities to reinforce key technical concepts, and focusing on practical applications of theoretical knowledge to enhance students' skill development in the BSIT program.

Keywords: peer mentoring, technical skills, IT Education, curriculum improvement

INTRODUCTION

Information technology is a growing industry in the global market. Many are into the implementation of information technology program as it is helpful in the development of technical skills among students. Planning for information systems is necessary in the development of skills as it plays a vital role in the development of activities and programs and at the same time increases productivity (Arcega, 2022).

Various information technology skills are necessary to build the performance level of the students. The 4th industrial revolution has brought many great applications to all areas of the society thereby requiring the necessary skills to ensure the delivery of the needed outcomes (Lam, et al., 2023). Moreover, various IT skills are also important to make sure that the intended outcomes are attained as required by the statutory requirements. Creativity and innovation are essential in design, alongside the effective use of color, typography, and layout to enhance user experience. Adhering to design principles, incorporating feedback, and ensuring functionality while maintaining aesthetics are key to successful design execution. Flexibility, consistency, and time management are crucial to adapting designs across platforms and meeting user needs (Hassan, 2023). Designers must also pay close attention to detail and accuracy while ensuring that their work aligns with user preferences. By balancing creativity with technical skills, they can produce cohesive and functional designs across various platforms.

Proficiency in using design and development software, such as Photoshop and Illustrator, is crucial for efficient workflow. Effective troubleshooting and problem-solving, as well as the ability to select appropriate tools for specific tasks, are key to optimizing design processes. Staying updated on software advancements and collaborating with others through shared platforms further enhances efficiency and accuracy (Ahmed, 2020).

Designers must be able to quickly learn and adapt to new tools, integrating them seamlessly into projects and applying advanced functions and shortcuts.

The ability to identify the root cause of a problem and apply logical, structured approaches is essential for effective problem-solving. Creative thinking and the use of data and analysis help in developing innovative solutions and making informed decisions. Persistence and critical thinking are crucial when resolving complex issues, while adaptability ensures that solutions can be adjusted as new information emerges. Collaboration with team members and timeliness in addressing problems further enhance the problem-solving process (Sarayreh, 2023). These skills are needed to further ensure the continuity of learning development.

The ability to set clear, measurable goals and develop a realistic project timeline is essential for effective project management. Delegating tasks, monitoring progress against milestones, and communicating updates to stakeholders help ensure the project stays on track. Post-project evaluations, collaboration, and the identification of lessons learned contribute to continuous improvement and project success (Firend, 2020). Flexibility in adapting plans, risk assessment, and budget management are key to addressing unforeseen challenges.

Understanding user needs through research and feedback is crucial for creating effective designs. Developing user personas and applying usability principles guide design decisions, while accessibility considerations ensure inclusivity. Designing intuitive interfaces and maintaining a focus on user satisfaction throughout the process ensures a positive user experience, with flexibility to adapt designs for diverse users and contexts (Olujimi, et al., 2022). Usability testing, along with wireframes and prototypes, enables iterative improvements based on user feedback.

Peer mentoring is a widely employed strategy in higher education to foster student development and integration (Gehreke, 2023). Schools must continue to give support programs to students especially asking the help of advanced students, similar in age and hierarchical level. A mentoring cycle could be started when, after some time, mentees could become peer mentors themselves and could pass on their study experiences and knowledge. In the long term, accrued costs for such support programs could be balanced by a more efficient study progress of the supported students. Consequently, the Social Learning Theory (Albert Bandura-1977) was utilized to highlight learning through observation and modeling, where peer mentors foster growth by exemplifying behaviors and providing feedback.

Conceptual Framework: The paradigm below reflects the model for analyzing the relationships of the input, process and output of the study.

Input		**Process**		**Output**
Curricular Content Evaluation Peer Mentoring Strategy Evaluation Results Academic Performance	→	Survey Descriptive Analytics Thematic Analysis	→	Proposed curriculum improvement

Figure 1. The Research Paradigm of the Study

Statement of the Problem:

This study sought answers to the following research questions:

1. What is the baseline technical skills of the IT students at SMCM?

2. How effective is the peer mentoring strategy in improving the technical skills of IT students at SMCM in terms of:

2.1. development and design skills;

2.2. tool utilization skills;

2.3. problem-solving and analytical skills;

2.4. project management and planning skills;

2.5. user-centered design skills; and

2.6. students' grades?

3. Is there a significant relationship between the peer mentoring strategy and the students grades who underwent peer mentoring sessions?

4. What curriculum improvement can be developed based on peer mentoring outcomes to enhance technical skills within IT courses at SMCM?

METHOD

Research Design

The study utilized the descriptive method of research in improving the technical skills of IT students through peer mentoring program in St. Mary's College of Meycauayan for first semester of the school year 2024-2025. Kerlinger (1964) considered survey research as social scientific research and focuses on people, the vital facts of people, and their beliefs, opinions, attitudes, motivations and behavior. Moreover, the qualitative research began with the inquiry process with philosophical assumptions about the nature of reality, how they know what is known, the inclusion of their values, the nature in which their research emerges, and their writing structures (Creswell,2007). To further know the students' perception in peer mentoring strategies, additional questions were added to the questionnaire. The qualitative data are expected to corroborate with the quantitative data, that is, the findings from the answers of the respondents from the questionnaire were expected to be backed up by the testimonies of the key informants. The convergent design is structured to strengthen the findings from the two data sets or reveal complementarity of the quantitative and qualitative findings. Indeed, this method is hoped to heighten the reliability and validity of the output of the study.

Research Sampling

The respondents of the study are the BSIT students in St. Mary's College of Meycauayan for school year 2024-2025. There was a total of 48 students who participated in the study.

Procedure

The researcher used the curricular content evaluation tool results which identifies the skills of the students in terms of the different skills necessary as an IT student. This is based on the skills set provided by the memorandum order from the governing agency. The evaluation was floated through Microsoft forms where BSIT students were asked to answer. The tool was also used to group the students on the skill that they need to improve in the semester. Outstanding IT students were asked by the researcher to conduct the peer mentoring session based also on their strengths. The mentors formulated the activities that they will execute based on the skills they need to develop among their peers. Sessions were conducted once a month and evaluations were provided to assess the learnings of the attendees. The four-point Likert scale was used to analyze their responses.

Mean Numerical Rating	Verbal Interpretation
3.27-4.00	Strongly Agree (SA)
2.52-3.26	Agree (A)
1.76-2.51	Disagree (D)

1.00-1.75	Strongly Disagree (SD)

Moreover, attached questions were added for other additional information from the respondents:

1. How do you feel the peer mentoring session impacted your understanding of the topics discussed, and what specific insights or skills did you gain?
2. What aspects of the peer mentoring session did you find most beneficial, and how can future sessions be improved to better support you're learning and professional growth?
3. How do you plan to apply the knowledge or skills gained from the mentoring session to your current role or future projects?

The researcher also gathered the grades of the students in their respective subjects.

Data Analysis

Upon the consolidation of the data gathered, the researcher employed frequency and percentage distribution. Descriptive statistics were applied, that is the computation of the mean and standard deviation. The researchers used SPSS in the treatment of data. Thematic analysis was also employed to analyze the responses of the participants in the provided questions. Shapiro-wilk test was performed to test the normality of the peer mentoring strategies evaluation and students' grades. Afterwards, Spearman's rank correlation coefficient was undertaken.

Ethical Consideration

The respondents were not subjected to being harmed in any way and full consent was asked from them as reflected in the preliminary directions in the questionnaire.

RESULTS AND DISCUSSION

Table 1: Demographic Profile

	Range/Indicators	**Frequency**	**Percentage**
Year Level	First	19	39.60%
	Second	6	12.50%
	Third	14	29.20%
	Fourth	9	18.70%
	Total	**48**	**100.00%**
Attendees in the Peer Mentoring	Session A	8	16.70%
	Session B	9	18.70%
	Session C	14	29.20%
	Session D	7	14.60%
	Session E	10	20.80%
	Total	**48**	**100.00%**

Table 1 indicates the distribution of year levels among the participants showing that the majority of respondents are from the first year (39.6%), followed by third-year students (29.2%), with second-year students accounting for the least at 12.5%. In terms of attendance in the peer mentoring sessions, Session C had the highest number of attendees (29.2%), while Session D had the fewest participants (14.6%). These results suggest that first-year and third-year students are more engaged in the peer mentoring program, with Session C being the most popular among the available sessions.

Table 2. Curricular Content Evaluation for BSIT Students

Criteria	Mean	Interpretation	SD
Knowledge for Solving Computing Problems			
Apply knowledge of computing, science and mathematics appropriate to the discipline	3.37	Outstanding	0.784
Understand best practices and standards and their applications	3.40	Outstanding	0.758
Problem Analysis			
Analyze complex problems and identify and define the computing requirements appropriate to its solution	3.43	Outstanding	0.854
Identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based system	3.40	Outstanding	0.625
Design/Development of Solutions			
Design, implement and evaluate computer-based systems, processes, components or programs to meet desired needs and requirements under various constraints	3.27	Outstanding	0.658
Integrate IT-based solutions into the user environment effectively	3.49	Outstanding	0.587
Modern Tool Usage			
Apply knowledge through the use of current techniques, skills, tools and practices necessary for the IT profession	3.49	Outstanding	0.698
Individual and Team Work			
Function effectively as a member or leader of a development team recognizing the different roles within a team to accomplish a common goal	3.39	Outstanding	0.632
Assist in the creation of an effective IT project plan	3.36	Outstanding	0.654
Communication			
Communicate effectively with the computing community and with society at large about complex computing activities through logical writing, presentations, and clear instructions	3.38	Outstanding	0.678
Computing Professionalism and Social Responsibility			
Analyze the local and global impact of computing information technology on individuals, organizations and society	3.45	Outstanding	0.745
Understand professional, ethical, legal, security and social issues and responsibilities in the utilization of information technology	3.38	Outstanding	0.795
Life-Long Learning			
Recognize the need for and engage in planning self-learning and improving performance as a foundation for continuing professional development	3.42	Outstanding	0.749
	3.40	**Outstanding**	**0.706**

Table 2 shows the evaluation of the BSIT students in their skills development. This finding is supported by the following indicators with higher means as follows: integrate IT-based solutions into the user environment

effectively and apply knowledge through the use of current techniques, skills, tools and practices necessary for the IT profession (M=3.49); analyze the local and global impact of computing information technology on individuals, organizations and society (M=3.45); and analyze complex problems and identify and define the computing requirements appropriate to its solution (M=3.43). However, the indicator that is design, implement and evaluate computer-based systems, processes, components or programs to meet desired needs and requirements under various constraints (M=3.27) got the lowest mean.

Table 3. Responses in Terms of the Effectiveness of the Peer Mentoring Strategy

		Mean	Interpretation	SD
1	Development and design skills	4.00	Strongly Agree	0.000
2	Tool utilization skills	3.66	Strongly Agree	0.491
3	Problem-solving and analytical skills	3.67	Strongly Agree	0.404
4	Project management and planning skills	3.70	Strongly Agree	0.497
5	User-centered design skills	3.71	Strongly Agree	0.495
	Average	**3.75**	**Strongly Agree**	**0.380**

Table 3 shows the mean ratings for the different skills indicate a general consensus of "Strongly Agree," with the highest rating for "Development and Design Skills" (Mean = 4.00) and the lowest for "Tool Utilization Skills" (Mean = 3.66). The overall average rating of 3.75 further reinforces a strong agreement with the importance of these skills, with a relatively low variability in responses (SD = 0.380).

Table 4. First Semester Academic Performance of the Students

Grades	Frequency	Percentage
96 and above	1	2.00%
91-95	5	10.43%
86-90	17	35.44%
81-85	21	43.75%
75-80	3	6.25%
74 and below	1	2.00%
Total	**48**	**100.00%**

Table 4 shows that the majority of participants (43.75%) scored between 81-85, followed by 35.44% of participants who scored between 86-90. A small proportion of participants (2.00%) scored either above 96 or below 74, indicating that most students' grades fall within the middle range. This suggests that the overall performance of the group is centered around the mid to upper grade ranges, with few students scoring very high or low.

Table 5. Test of Normal Distribution (Shapiro-Wilk Test)

Variable	W-Statistic	p-value	Interpretation
Peer Mentoring Strategy	0.799	<0.001	Deviates Significantly from Normality
Average Grades of Attendees	0.855	<0.001	Deviates Significantly from Normality

To determine whether the variables "Peer Mentoring Strategy" and "Average Grades of Attendees" followed a normal distribution, a Shapiro-Wilk test was conducted. The results revealed that the "Peer Mentoring Strategy" scores ($W = 0.799$, $p < 0.001$) and the "Average Grades of Attendees" ($W = 0.855$, $p < 0.001$) significantly deviated from a normal distribution. These findings indicate that the data for both variables do not meet the assumption of normality required for parametric statistical tests. As a result, a non-parametric statistical approach, specifically Spearman's rank correlation, was applied for further analysis of the relationship between the variables.

Table 6. Spearman's Rank Correlation between Peer Mentoring Strategy and Average Grades of Attendees

Variable 1	Variable 2	Spearman's Rank Correlation Coefficient	p-value	Interpretation
Peer Mentoring Strategy	Average Grades of Attendees	0.5521	0.0247	Moderate positive correlation ($p < 0.05$), statistically significant

The Spearman's Rank Correlation test was applied to assess the relationship between the "Peer Mentoring Strategy" scores and the "Average Grades of Attendees." The calculated Spearman's rank correlation coefficient is 0.5521, which indicates a moderate positive correlation between the two variables. The p-value of 0.0247 is less than the 0.05 significance threshold, suggesting that this correlation is statistically significant. This result indicates that there is a moderate positive relationship between the peer mentoring strategy and students' grades. In other words, as the peer mentoring strategy score increases, the students' grades tend to improve as well. Therefore, the data provides significant evidence that the peer mentoring strategy has an impact on student performance.

Meanwhile, the following are the results for the additional provided questions:

1. How do you feel the peer mentoring session impacted your understanding of the topics discussed, and what specific insights or skills did you gain?

Codes	Sub Themes	Theme
Clear and understandable explanations. Smooth and relevant presentations. Effective concept delivery. Engaging and professional teaching.	Content Clarity and Quality Delivery	Impact of Peer Mentoring on Learning and Development
Deeper coding understanding. Practical problem-solving strategies. Safe online practices. Boolean logic mastery. Enhanced function usage.	Skills and Knowledge Acquisition	
Increased problem confidence. Simplified complex topics. Motivational mentor guidance. Boosted self-assurance.	Confidence and Motivation	
Peer-driven insights. Diverse collaborative perspectives.	Collaborative Learning	

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Enriched teamwork learning.		
Enjoyable and informative. Effective mentorship delivery. Exceeded expectations.	General Positive Feedback	

The peer mentoring session had a strong positive impact on participants' learning and development. Clear explanations and effective delivery ensured participants understood complex topics, enhancing their skills in areas like coding, Boolean logic, and problem-solving. The session fostered confidence, simplified challenges, and motivated learners through professional guidance. Collaboration enriched learning through peer-driven insights and diverse perspectives. Participants praised the session as enjoyable, informative, and effective, reflecting its success in supporting their learning journey.

2. What aspects of the peer mentoring session did you find most beneficial, and how can future sessions be improved to better support your learning and professional growth?

Codes	Sub Themes	Theme
Applying programming languages Safe downloading practices Recognizing trusted resources Avoiding risky websites Project management insights Designing with effort Applicable to daily life	Practical Application of Skills	Key Benefits and Improvements for Peer Mentoring Sessions
Sharing ideas collaboratively Socializing while coding Fun and engaging Gaining peer insights	Collaborative Learning and Engagement	
UI and UX learning Improved UI design Enhanced problem-solving skills Logical thinking improvement Planning skill development	Skill Development	
Clear and concise explanations Learning essential coding concepts Understanding for loops Logical structure clarity	Effective Teaching and Delivery	
Gaining new knowledge Easier problem-solving methods Applying skills professionally Extended session time	Opportunities for Future Growth	

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The peer mentoring session offered significant benefits, focusing on practical skill application, such as using programming languages, mastering design concepts, and improving problem-solving strategies. Participants highlighted the value of collaborative learning, where sharing ideas and engaging with peers enhanced their understanding and enjoyment of coding. The session's effective teaching methods were praised for clear explanations and well-structured discussions, making complex topics like for loops and logical problem-solving more accessible. Participants appreciated the session's immediate applicability in both daily life and professional settings. For future improvements, suggestions included extending session durations to cover more topics and continuing the interactive and engaging approach.

3. How do you plan to apply the knowledge or skills gained from the mentoring session to your current role or future projects?

Codes	Sub Themes	Theme
Apply to future projects Use in current projects Create designs effectively Avoid unverified sites Prevent viruses and hackers	Practical Application	Application of Knowledge and Skills
Respect gained knowledge Enhance existing skillset Nurture learned skills Study harder consistently	Skill Development	
Explore new opportunities Prepare for final exams Plan and execute systematically Advocate learned practices	Professional Growth	
Use in career Incorporate in major subjects Apply to upcoming activities Design websites proficiently	Knowledge Integration	

Participants plan to leverage the knowledge and skills acquired from the mentoring session in various practical and professional contexts. They emphasized applying what they learned to future projects, current roles, and academic tasks, including final exams. The session also equipped them with strategies to avoid cybersecurity risks, such as unverified sites and malicious files. Many intend to integrate the knowledge into programming and design tasks, enhancing their abilities to create effective systems, websites, and applications. Others aim to use the session as a foundation for career growth, nurturing their skills and exploring new opportunities. Suggestions included respecting and applying the gained insights to strengthen their existing skillsets and professional planning. Overall, the session fostered a proactive approach to applying learning in real-world scenarios.

Mixed Method Analysis

Combining quantitative and qualitative insights reveals a cohesive narrative:

1. Quantitatively, the strong agreement on the effectiveness of peer mentoring aligns with participants' qualitative reflections on improved skills, confidence, and collaboration.

2. Qualitative feedback further enriches the understanding of quantitative outcomes, highlighting specific areas of impact, such as collaborative learning and professional growth, which are not directly measured in numerical data.

3. The moderate positive correlation between mentoring strategies and academic performance supports the qualitative evidence of participants applying learning effectively in academic tasks.

CONCLUSION

The researcher concludes that:

1. first-year and third-year students showed the highest levels of participation in the peer mentoring program, with Session C being the most popular among attendees. This suggests these year levels are more engaged in the program, likely seeking support to enhance their academic performance;

2. a strong consensus among participants regarding the importance of the peer mentoring program, particularly in developing "Development and Design Skills," with an average rating of 4.00. This shows that participants highly value the practical skills taught, with a consistent perception of their significance across respondents;

3. peer mentoring has a significant positive impact on students' technical skills, particularly in areas such as programming, design, and problem-solving. Participants expressed a high level of appreciation for the clarity and practical applicability of the skills taught during sessions, which suggests that peer mentoring can be an effective method to enhance technical competencies within IT courses;

4. peer mentoring sessions promote collaborative learning, allowing students to engage with and learn from each other. This approach not only enhanced their technical knowledge but also built their confidence in applying these skills to real-world scenarios, such as coding projects and problem-solving task; and

5. peer mentoring sessions revealed that students highly valued the interactive and hands-on nature of the learning experience. This suggests that the curriculum could be improved by incorporating more practical, real-world tasks, where students can directly apply technical concepts to projects, case studies, and problem-solving exercises, similar to the approach used in the peer mentoring sessions.

RECOMMENDATIONS

The researcher recommends the following for the curriculum improvement of the BSIT program:

1. formalize peer mentoring as part of the curriculum. Peer-led workshops or mentoring sessions could be included to reinforce key technical topics and provide students with additional learning support. These sessions should focus on practical applications of theoretical knowledge;

2. based on the success of peer mentoring in promoting collaborative learning, it is recommended to integrate more group projects, peer feedback, and collaborative problem-solving exercises into the curriculum. This would allow students to develop not only technical skills but also teamwork, communication, and critical thinking skills, which are essential for their future careers in IT; and

3. to further enhance technical skills, the curriculum should place a stronger emphasis on hands-on learning opportunities. This could include coding labs, design challenges, real-world simulations, and industry-based projects where students can apply the technical skills they learn in a practical, results-driven environment. By integrating more interactive and practical learning activities, the curriculum will better equip students with the skills necessary for success in the IT industry.

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