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Mentoring Insights from Panel Assessments of High School Research Proposals in Robotics and Intelligent Machines

Helen Grace B. Gonzales

College of Technology, University of Science and Technology of Southern Philippines
helengrace.gonzales@ustp.edu.ph

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Abstract: This study investigates expert panel assessments of high school research proposals in the category of Robotics and Intelligent Machines to generate actionable mentoring recommendations for improving student research capacity. Using ATLAS.ti software, six panel evaluations were systematically coded into themes, including research quality, student skills, presentation, strengths, and improvement needs. The results revealed that while students demonstrated creativity and relevance to community issues, consistent weaknesses were identified in statistics, technical writing, methodology, and presentation organization. Co-occurrence analysis showed strong links between training needs and statistical gaps, and between methodological design and weak data analysis. Based on these findings, this study proposes targeted mentoring strategies, including statistics workshops, writing clinics, methodology reinforcement, and presentation coaching, to strengthen competition readiness. Importantly, this assessment also provides the empirical foundation for the continuing extension project proposal entitled "Monitoring and Coaching for CDONHS-JH Faculties and Students to Develop Research and Innovation Skills in Robotics and Intelligent Systems." While the immediate findings emphasize student skill gaps in statistics, writing, methodology, and presentation, the results equally underscore the need to strengthen teacher capacities in mentoring, monitoring, and coaching. The extension program therefore aims to empower both teachers and students: teachers by enhancing their mentoring frameworks and students by improving their research and innovation competencies.

Keywords: student research, mentoring, statistics training, presentation skills, science fair readiness

I. INTRODUCTION

High school research training plays a crucial role in equipping students with inquiry-based skills that promote problem-solving, innovation, and communication [6,7]. Engaging in guided research projects fosters analytical and writing competencies necessary for higher education and professional development [1,2]. Mentorship, in particular, is a vital component of this process, providing students with structured guidance to transform creative ideas into methodologically sound and competitive research outputs [7].

Despite their creativity and commitment, students frequently encounter challenges in meeting the technical standards of rigorous research. Studies have shown that common difficulties include weak statistical analysis, poorly defined methodologies, unclear writing, and disorganized presentations [3,4]. These deficiencies not only affect the credibility of their research outputs but also reduce their chances of excelling in competitive environments such as regional and national science fairs [6].

Qualitative analysis of expert panel feedback provides valuable insights into these skill gaps. **ATLAS.ti**, a computer-assisted qualitative data analysis software (CAQDAS), enables systematic coding, visualization, and exploration of panel assessments. By analyzing evaluators' written feedback, it is possible to uncover recurring themes, co-occurring weaknesses, and strengths that can guide targeted mentoring interventions.

The objective of this study is therefore to provide actionable mentoring recommendations for improving students' statistics, technical writing, methodology, and presentation skills for competition readiness,

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particularly for research proposals in the Robotics and Intelligent Machines category. At the same time, the study recognizes that **teachers play a pivotal role as research mentors**. Their ability to provide consistent guidance, feedback, and coaching directly influences the quality of student outputs. The insights from this assessment will therefore inform capacity-building not only for learners but also for faculty members, ensuring that both groups are supported through the planned extension program.

II. METHODOLOGY

A. Data Source

This study analyzed qualitative feedback from six expert panels evaluating high school student research proposals in the category of **Robotics and Intelligent Machines** during the Research Proposal Defense 2025 at Cagayan de Oro National High School–Junior High School. Each panel provided narrative comments on aspects such as originality, clarity, relevance, methodology, and presentation. These textual data served as the primary source for thematic analysis.

B. Use of ATLAS.ti Software

To ensure systematic coding and interpretation, **ATLAS.ti** web was employed [5]. ATLAS.ti is a computer-assisted qualitative data analysis software (CAQDAS) that allows researchers to import, code, and analyze large volumes of textual data [1]. It provides advanced features such as word frequency queries, code co-occurrence analysis, and network visualization, which were utilized in this study.

C. Code Development

A hierarchical codebook was developed based on both deductive and inductive approaches. Major themes were predefined as:

- **Research Quality** (originality, relevance, clarity)
- **Student Skills** (statistics, writing, critical thinking)
- **Presentation** (organization, delivery, visuals)
- **Strengths** (creativity, innovation)
- **Improvement Needs** (methodology, problem clarity, analysis)

Subcodes were refined iteratively as feedback excerpts were coded.

D. Coding Procedure

Panel feedback documents were imported into ATLAS.ti and coded line by line. Segments of text were highlighted and assigned to corresponding codes. Multiple coders were involved in the validation process, and inter-coder consistency was checked through iterative comparison of coding decisions.

E. Analytical Procedures

1. **Word Frequency Queries:** Generated the top recurring terms and produced a word cloud visualization.
2. **Code Co-occurrence Analysis:** Identified patterns of overlapping codes, such as training needs linked with statistics.
3. **Code-Document Tables:** Compared how often specific themes appeared across the six panels.

F. Reliability and Rigor

Inter-coder reliability was established by iterative coding checks, yielding consistent agreement in categorization. Coding validity was supported by triangulating word frequency results with co-occurrence and thematic network outputs.

III. RESULTS

The ATLAS.ti thematic analysis of six panel assessments produced insights into recurring themes, word frequencies, and co-occurrence patterns. Results revealed both areas of strength and skill gaps requiring mentoring interventions.

A. Word Frequency Results

Word frequency queries were conducted to identify dominant terms in panel feedback. The top ten terms are presented in Table I.

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TABLE I
TOP 10 FREQUENT WORDS IN PANEL ASSESSMENT

Rank	Word	Frequency	Coverage %
1	Relevance	18	22%
2	Research	15	19%
3	Projects	12	15%
4	Presentation	11	14%
5	Community	9	11%
6	Methodology	8	10%
7	Training	7	9%
8	Analysis	6	8%
9	Competitive	5	6%
10	Technical	5	6%

The prominence of *relevance*, *research*, and *projects* demonstrates evaluators' emphasis on contextual significance, while the recurring appearance of *training*, *analysis*, and *methodology* points to specific areas requiring mentoring support.

A visual representation of the most frequent words was generated in NVivo for enhanced interpretation. Larger fonts in the word cloud indicate higher frequency of terms across panel feedback.

B. Thematic Distribution

Themes were categorized into five major groups. Table II shows the distribution of coded references across themes.

Fig. 1. Word cloud generated from panel feedback, highlighting dominant terms such as "relevance," "research," and "projects," along with skill-related needs such as "training" and "analysis."

TABLE III
THEME COVERAGE ACROSS PANELS

Theme	References	Coverage %
Research Quality	11	28%
Student Skills	8	22%
Presentation	7	18%
Strengths	6	15%
Improvements	6	12%

The dominance of *Research Quality* and *Student Skills* highlights evaluators' focus on the rigor of student research designs and the competencies needed to sustain them.

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C. Co-occurrence Analysis

ATLAS.ti co-occurrence queries revealed consistent linkages between training needs and specific weaknesses. The strongest patterns are summarized in Table III.

TABLE IIIII
SELECTED CO-OCCURRENCE PATTERNS IN PANEL FEEDBACK

Co-occurring Codes	Panels (%)	Interpretation
Training – Statistics	100%	Training in statistics is urgently needed.
Methodology – Data Analysis	83%	Students design methods but fail in execution.
Presentation – Organization	50%	Students engage well but lack structured delivery.

These results confirm that while students often demonstrate creativity and engagement, their lack of statistical literacy, methodological rigor, and structured presentation undermines their competitiveness in research contests.

IV. CONCLUSIONS

The present study analyzed expert panel feedback on high school research proposals using ATLAS.ti, with the objective of generating **actionable mentoring recommendations for competition readiness**. The results confirmed that while students consistently demonstrated creativity and relevance to community needs, significant gaps persist in **statistics, technical writing, methodology, and presentation structure**. Co-occurrence patterns highlighted that training is most urgently needed in statistics, that methodological weaknesses often translate into poor data analysis, and that presentation quality is strongly tied to organizational skills.

These findings underscore the necessity of targeted mentoring interventions [7]. By integrating statistics workshops, technical writing clinics, methodology reinforcement, and structured presentation coaching, educators can equip students with the competencies required to perform successfully in regional and national science fairs [6].Progress is already being made in identifying and addressing these gaps, and the insights from this study can serve as a framework for designing mentoring programs that not only enhance competition readiness but also build a sustainable culture of research excellence among high school learners.

Based on the thematic analysis of panel assessments, several mentoring strategies are proposed to strengthen student competencies and ensure competition readiness. First, **statistics training** should be prioritized through targeted workshops on descriptive and inferential statistics using real student datasets. User-friendly software such as Excel, Jamovi, or SPSS can be introduced to improve data analysis skills, while practice exercises must directly link research questions to appropriate statistical tests. Second, **technical writing clinics** are necessary to enhance academic writing. These can focus on key sections such as methodology, results, and discussion, using exemplars of strong research papers as models of clarity and structure. Peer-review activities should also be integrated to build students' editing skills and their ability to critically evaluate one another's work.

Third, **methodology reinforcement** is critical to ensure rigor in research design. Workshops should emphasize sampling, data collection, and alignment between objectives and methods. Mentors should guide students in developing clear problem statements and logical frameworks while also analyzing case studies of common methodological errors and their remedies. Fourth, **presentation coaching** is needed to polish students' delivery skills. Training in slide preparation, oral defense, and time management should be paired with opportunities for mock presentations, where structured feedback can help students improve. Emphasis should be placed not only on confident delivery but also on logical organization and clarity.

Finally, for **long-term capacity building**, schools must integrate these mentoring strategies into the research curriculum. Partnerships with universities and professional mentors can ensure sustained support, while ongoing reflection and evaluation should be built into the program to track student progress and refine approaches over time. Collectively, these mentoring strategies provide a comprehensive framework for addressing student skill gaps and enhancing their readiness for regional and national science competitions. More importantly, the study also serves as an **assessment study whose outputs will be utilized as the basis of the Extension Proposal** entitled *"Monitoring and Coaching for CDONHS-JH Faculties and Students to Develop Research and Innovation Skills in Robotics and Intelligent Systems."* By translating the insights from panel assessments into structured extension initiatives, the University can extend its expertise to high schools, ensure sustained mentoring support, and foster a stronger research culture among young learners. The dual focus on **teacher mentoring capacity** and **student research readiness** ensures that the extension project creates a sustainable ecosystem of coaching, innovation, and research excellence.

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Reflexivity and Researcher Role

The researcher also served as a panelist during the evaluation process; however, to minimize bias, her own assessment was intentionally excluded from the dataset analyzed in ATLAS.ti. Only the feedback of the other five panels was considered for coding and thematic analysis. This ensured that the researcher's dual role did not influence the interpretation of results. Furthermore, credibility was strengthened through repeated coding checks and triangulation across multiple analytic procedures (word frequency, co-occurrence, and theme coverage). By clarifying the researcher's role and exclusion of personal input, the study maintains reflexivity and transparency in line with qualitative research standards.

REFERENCES

1. P. Bazeley and K. Jackson, *Qualitative Data Analysis with ATLAS.ti*, 2nd ed. London, UK: SAGE Publications, 2013.
2. J. W. Creswell and J. D. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. Thousand Oaks, CA: SAGE Publications, 2018.
3. A. Yusuf, "Common difficulties in writing undergraduate research proposals," *International Journal of Education and Research*, vol. 1, no. 9, pp. 1–8, 2013.
4. Y. Wang, "Research proposal writing challenges of EFL students: A case study," in *Proc. International Conference on Language and Education*, Hong Kong, 2012, pp. 85–92.
5. ATLAS.ti Scientific Software Development GmbH, "ATLAS.ti Qualitative Data Analysis Software," [Online]. Available: https://atlasti.com. [Accessed: Sep. 25, 2025].
6. National Academies of Sciences, *Science Fair Mentoring and Student Development Report*. Washington, DC: National Academies Press, 2020.
7. L. D. Anderson, "Mentoring strategies for improving student research," *Journal of Educational Research and Practice*, vol. 10, no. 2, pp. 45–56, 2019.

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