Innovations

Designing a Data Gathering Tool for Trends, Problems, Challenges and Innovations in Graduate Education

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***Abstract**: The dynamic evolution of graduate education necessitates effective tools to assess emerging trends, problems, challenges, and innovative practices. This study aimed to design, develop, and validate a data gathering instrument tailored to evaluate these aspects within Baguio Central University (BCU). The research holds significant academic value, offering insights to inform policy decisions and enhance program quality. Employing a convergent parallel mixed-methods approach, the instrument integrated quantitative Likert-scale items with qualitative open-ended questions. Guided by the Input-Process-Output model, the development process considered inputs such as technological advancements, demographic and societal factors, institutional resources, and global contexts. The process involved literature review, curriculum analysis, technology integration, stakeholder collaboration, and leadership strategies. The outputs included a validated and comprehensive data gathering tool designed to assess trends, problems, challenges, and innovations in graduate education; a conceptual framework guided the use of the tool to understand the complexities of graduate education; and initial insights gained during the tool's design and validation process. Anticipated outcomes encompass enhanced education quality, increased accessibility, alignment with workforce needs, and sustainable institutional growth. Findings revealed key trends, including integrating technology and flexible learning pathways, alongside challenges such as financial constraints and technology access disparities. Innovative strategies, notably industry partnerships and personalized learning initiatives, were also identified. The validated tool serves as a reliable mechanism for ongoing assessment and continuous improvement of graduate programs, addressing existing gaps in the literature. Practically, its implementation supports evidence-based decision-making and institutional advancement. This study aligns with Sustainable Development Goal 4, Target 4.3, and Indicator 4.3.1 by promoting equal access to quality tertiary education by developing evaluative tools that inform policy and practice.*

***Keywords:** graduate education, data gathering tool, trends, problems, challenges, innovations, Sustainable Development Goal 4.3.1*

I. Introduction

Recent global research underscores the critical role of effective data gathering tools in capturing trends, problems, challenges, and innovations within graduate education. Across diverse contexts from Latin America to North America and Africa studies emphasize the need for context-specific, robust instruments that enable institutions to generate actionable insights and support evidence-based decision-making.

In Latin America, Bautista-Godínez et al. (2024) highlight the importance of stakeholder engagement and data literacy in designing qualitative instruments tailored to university settings.

In North America, initiatives such as the University of Minnesota's "Transforming Graduate Education with Data-Driven Insights" (Lane, 2025) illustrate the power of data-driven approaches to enhance transparency and equity in graduate admissions and program design.

African scholarship (Subaveerapandiyan, 2023) focuses on improving research data management and standardizing protocols to foster open science and reliable data collection in higher education.

The evolving landscape of graduate education worldwide is marked by technological innovation, shifting workforce demands, and changing learner expectations (Virtual Internships, 2025; Holon IQ, 2025).

The integration of artificial intelligence (AI) tools and personalized learning platforms has revolutionized pedagogy, enabling real-time analytics and tailored feedback to improve student outcomes (Campus Technology, 2025; Kuzminykh et al., 2024). Concurrently, micro-credentials and modular learning pathways cater to lifelong learners and professionals seeking flexible upskilling options aligned with industry needs (Varadarajan et al., 2023; Clark C. et al, 2025).

Despite these innovations, graduate education faces persistent challenges globally and locally. Financial constraints, uneven technology access, and the mismatch between academic programs and labor market demands limit student access, engagement, and employability (Venit, E., 2025; OECD, 2025; Romero & Ventura, 2024). The COVID-19 pandemic has further stressed institutional capacities, emphasizing the urgency for adaptive, inclusive, and culturally responsive pedagogy (Villarino, R., 2025).

Institutional capacity to respond effectively hinges on accurate, comprehensive data that reflect the diverse experiences of students, faculty, and administrators (Watermark Insights, 2024; WCET, 2025). Well-designed data gathering tools not only capture statistical trends but also illuminate qualitative dimensions such as mentorship, community engagement, and practical skill development—key factors for student success and program relevance.

Furthermore, the development and implementation of innovations—such as hybrid learning models, industry partnerships, and AI-enabled personalized feedback—depend on data systems that provide timely, actionable information (Dent, D. et al, 2024; Riipen, 2024). Addressing ongoing programmatic

challenges, including faculty training gaps and online learning engagement issues, requires institutions to harness these data tools for targeted interventions (Campus Technology, 2025; WCET, 2025).

In conclusion, global scholarship consistently highlights the necessity of strategic, context-sensitive data gathering tools to navigate the complexities of graduate education. These tools are vital for guiding policy, curriculum design, resource allocation, and continuous improvement. By aligning with evolving global trends and addressing persistent local challenges, such tools empower institutions to enhance the quality, equity, and impact of graduate education in a rapidly changing world.

Theoretical and conceptual framework

The development of the comprehensive data gathering tool for graduate education is grounded in key theoretical perspectives explaining its complexity. Systems Theory (Bertalanffy, 1968; Checkland, 1999) views educational institutions as interconnected systems, emphasizing data on inputs, processes, outputs, and feedback involving students, faculty, curriculum, administration, and external stakeholders.

Diffusion of Innovations Theory (Rogers, 2003) offers insight into how new practices are adopted, underscoring the importance of tracking trends, problems, challenges, and innovation impacts to maintain institutional responsiveness. Constructivist Learning Theory (Vygotsky, 1978; Bruner, 1996) stresses meaningful, context-rich learning that fosters critical thinking and professional skills for real-world readiness.

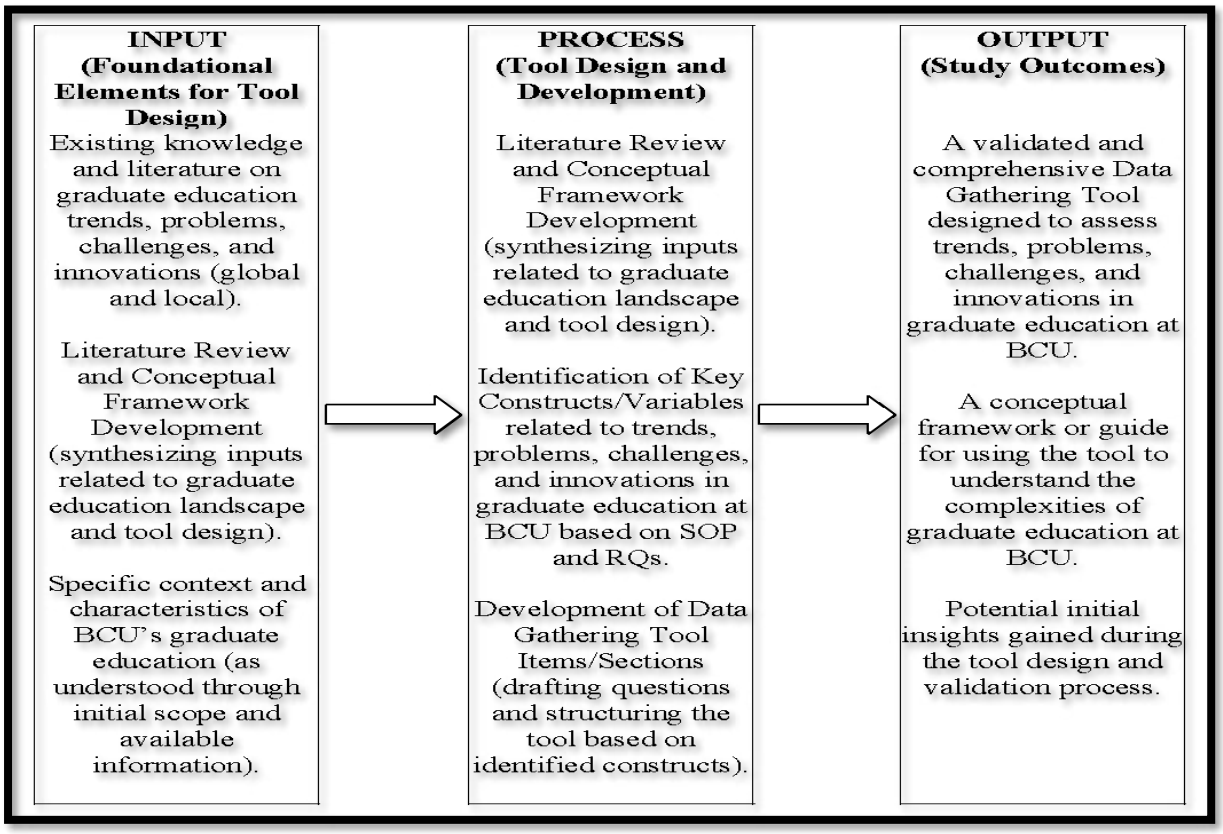
These theories inform a conceptual framework with four components guiding the tool's design:

1. Trends in Graduate Education – Identifying technological advances, curriculum innovations, and demographic shifts to ensure relevance.
2. Problems and Challenges – Addressing barriers like funding shortfalls, faculty training gaps and misalignment with industry needs affecting quality and access.
3. Innovations in Graduate Education – Examining strategies such as digital transformation, flexible learning, and industry partnerships to meet emerging challenges.
4. Stakeholder Engagement – Recognizing the roles of faculty, administrators, students, and external partners in shaping education through ongoing collaboration.

Together, these components create a holistic framework that guides data collection and analysis at BCU, supporting evidence-based decision-making, continuous improvement, and strategic planning.

Paradigm of the study

Figure 1 Paradigm of the Study



The Input-Process-Output (IPO) model provides a clear framework for designing a data gathering tool to assess trends, problems, challenges, and innovations in graduate education at BCU. Inputs include technological advances, demographic and societal factors, relevant policies like CMO No. 15 (2019), institutional resources such as funding and faculty readiness, and global influences like pandemics and internationalization. The Process involves literature review, curriculum analysis, technology integration, stakeholder collaboration, and strategic leadership. Expected Outputs are improved education quality, greater accessibility, better alignment with workforce needs, and sustainable growth.

Significance of the study

This study addresses the need for a data gathering tool to capture trends, problems, challenges, and innovations in graduate education at BCU. By identifying key issues affecting program quality and effectiveness, the tool will offer valuable insights for academic leaders, policymakers, and educators, supporting data-driven decision-making and strategic planning. The research aims to fill critical gaps and inform improvements across theoretical, practical, and policy areas, enhancing understanding of factors influencing graduate program quality, accessibility, and stakeholder engagement. Ultimately, it provides an evidence-based foundation to improve leadership, student success, equity, and institutional sustainability amid ongoing change.

Objectives of the study

This study aims to design and develop a comprehensive data gathering instrument to assess the trends, problems, challenges, and innovations shaping graduate education at Baguio Central University (BCU). By examining the current landscape of graduate programs, the study seeks to generate meaningful insights into the factors that influence their quality, relevance, and overall effectiveness.

Specifically, the study seeks to address the following questions:

1. What are the key trends currently shaping graduate education at Baguio Central University?
2. What are the problems affecting graduate education?
3. What are the challenges of graduate education?
4. What are the innovations currently transforming graduate education?
5. How do BCU stakeholders navigate the challenges and implement meaningful measures to enhance graduate education?

In summary, the creation of this data-gathering tool represents a strategic initiative in response to the dynamic and multifaceted nature of graduate education. It acknowledges the diverse needs of learners, the institutional demands faced by academic programs, and the evolving opportunities introduced by technological and pedagogical advancements. This study ultimately aims to contribute to the continuous improvement of graduate education at BCU by offering a reliable, holistic, and contextually grounded assessment framework.

II. Methodology

Study design

This study employed a convergent parallel mixed-methods design to develop and validate a data gathering tool for assessing trends, problems, challenges, and innovations in graduate education at BCU. The design enabled simultaneous collection of quantitative data (via structured surveys) and qualitative data (via open-ended responses), with integration during analysis to ensure methodological rigor and contextual depth (Creswell & Clark, 2017). The dual-phase approach is aligned with the Data Gathering Instrument and Methods Selection (DCIMS) framework, which emphasizes aligning tools with research objectives, theoretical foundations, and stakeholder needs (Kritika, 2024; Bastos et al., 2014).

Population and sampling

The study targeted BCU's graduate education stakeholders: 640 students, 33 faculty members, and 6 administrators during the 2024–2025 academic year. In the quantitative phase, total enumeration was applied for students and faculty, while administrators were included via census sampling. A power analysis (α =

0.05, β = 0.20) confirmed a minimum sample of 291 participants for statistical validity. For the qualitative phase, a purposive sampling selected 15 participants (5 students, 5 faculty, and 5 administrators) based on direct engagement with graduate program innovations. Sampling continued until thematic saturation was achieved.

Data gathering tool development

The researcher-developed questionnaire followed a four-stage process. 1) Literature Synthesis: Items were drawn from peer-reviewed studies on graduate education trends (e.g., digital learning, interdisciplinary research) and challenges (e.g., funding gaps, equity issues). Frameworks like the DCIMS model guided the mix of quantitative (Likert-scale) and qualitative (open-ended) items. 2) Expert Validation: A panel of 12 educational measurement specialists reviewed the tool for face validity, clarity, and alignment with BCU's graduate school goals and study objectives. 3) Revisions: Ambiguities and redundancies were removed. 4) Pilot Testing: A trial with 30 participants (excluded from the main study) showed strong reliability, with Cronbach's alpha ranging from 0.78 to 0.89—well above the 0.5 threshold (Bastos et al., 2014). Final Tool: Section A – Demographics (1 item: enrolled program); Section B – 40 Likert-scale items (10 each for trends, problems, challenges, and innovations); Section C – Open-ended questions exploring stakeholder experiences.

Data collection procedures

After Dean's Office approval and informed consent, data collection followed mixed methods and best practices (Creswell & Clark, 2017). Quantitative surveys were distributed manually and via BCU's learning system, with automated reminders yielding an 82% response rate (n = 503) from students, faculty, and administrators. Simultaneously, 15 purposively sampled stakeholders participated in 30–45 minute semi-structured interviews, with verbatim transcripts and probing questions enhancing context. Institutional documents like strategic plans and accreditation reports were also analyzed to triangulate findings. This concurrent approach ensured rigor by combining quantitative scope with qualitative depth.

Data analysis

Quantitative data were analyzed using SPSS to generate descriptive statistics (means, frequencies) and conduct inferential tests (ANOVA, regression) to examine relationships, such as the effect of funding availability on innovation adoption. Qualitative data were thematically analyzed, with transcripts coded into categories like "technology integration barriers" and "community-driven solutions," using NVivo to identify key patterns. Findings were integrated through a joint display matrix that aligned quantitative results—e.g., 68% citing inadequate research funding—with qualitative narratives, such as how "cross-

departmental grants partially offset budget cuts," enhancing the tool's contextual relevance and comprehensiveness (Creswell & Plano, 2017).

Ethical considerations

Ethical considerations were rigorously observed throughout the study to uphold integrity, transparency, and participant protection. The use of AI tools, specifically Gemini AI and Perplexity AI, was strictly limited to grammar refinement and data organization, with no involvement in data analysis or interpretation, ensuring full intellectual ownership by the researchers and adherence to Elsevier's Responsible AI Principles (2023), which emphasize accountability and transparency in AI-assisted scholarly work. To mitigate bias, the study employed the Data Collection Instrument and Method Selection (DCIMS) framework, which strategically aligned the tool's design with the unique contextual needs of BCU, thereby minimizing selection and measurement biases. Participant privacy and confidentiality were safeguarded, complying with ethical standards and data protection regulations.

III. Results and discussion

The study aimed to design, develop, and validate a data gathering tool specifically tailored to assess the trends, problems, challenges, and innovations in graduate education at BCU. Grounded in a mixed-methods approach, the tool was constructed to capture the diverse experiences and perspectives of students, faculty, and administrators. Findings from the pilot administration and initial data collection offered valuable insights into both the effectiveness and reliability of the tool itself, as well as the current state of graduate education at BCU.

Results

This section presents the structure and content of the data gathering tool developed to assess trends, problems, challenges, and innovations in graduate education at BCU. Designed through literature review, stakeholder input, and pilot testing, the tool combines quantitative scales and qualitative questions to ensure reliability, validity, and relevance. The following sections detail the quantitative measures and open-ended items capturing the experiences of graduate students, faculty, and administrators.

Part 1. Quantitative data gathering tool

1.1 The data gathering tool to assess the key trends currently shaping graduate education at BCU

The Current Trends section evaluates how BCU's graduate programs incorporate contemporary developments and best practices. It gathers stakeholder perspectives on key areas like the UN Sustainable Development Goals (SDGs), technology use, flexible learning, and responsiveness to workforce and

demographic shifts. This section highlights BCU's alignment with evolving education standards and readiness to address future challenges.

Table 1 Quantitative Data Gathering Tool for Assessing Key Trends Shaping Graduate Education at BCU

1.1 Current Trends	**Very Much Adhered 5**	**Much Adhered 4**	**Moderately Adhered 3**	**Slightly Adhered 2**	**Least Adhered 1**
1. The integration of UN Sustainable Development Goals (SDGs) in instruction, research, publication, production of creative works, community extension activities, internationalization like WURI Rankings, enhances my learning experience in the program.					
2. The university effectively uses technology to support personalized learning.					
3. Flexible course scheduling and elective offerings meet my professional and academic needs.					
4. The program supports lifelong learning through short courses or micro-credentials.					

5. Online learning options are accessible and suited to my schedule.					
6. The use of data analytics to track student progress and personalize academic advising improves academic support and guidance.					
7. Hybrid learning provides a balanced and effective approach to education.					
8. The university considers demographic changes in planning graduate programs.					
9. Faculty members are prepared to use AI and digital tools in instruction.					
10. The program adapts to current trends in higher education and workforce demands					

Legend

1.1 Current Trends			
Numerical Value	**Statistical Limits**	**Descriptive Equivalent**	**Symbol**
5	4.21 - 5.00	Very Much Adhered or Always	VMA or A
4	3.41 - 4.20	Much Adhered or Often	MA or O
3	2.61 - 3.40	Moderately Adhered or Sometimes	MA or S
2	1.81 - 2.60	Slightly Adhered or Rarely	SA or R
1	1.00 - 1.80	Least Adhered or Never	LA or N

The Current Trends section of the quantitative data gathering tool evaluates how well BCU's graduate programs align with contemporary developments in higher education. Respondents rate practices such as integration of the UN Sustainable Development Goals (SDGs), technology adoption, flexible learning, and data-driven academic support. This provides a snapshot of BCU's responsiveness to evolving educational demands.

Findings have important implications for institutional planning. High scores suggest alignment with global standards and readiness to meet student and employer expectations, while lower scores highlight areas needing investment, such as faculty training in digital pedagogy or enhanced hybrid learning support. This data supports targeted interventions and policy reforms to maintain BCU's graduate education as dynamic and inclusive.

Recent research underscores the importance of tracking these trends. Bautista-Godínez et al. (2024) found that learning analytics and tech-enhanced instruction improved student engagement in Latin American universities. Lane (2025) highlighted the role of data-driven decision-making in graduate admissions and curriculum design in North America. In the Asia-Pacific region, integrating SDGs and personalized learning increased student satisfaction and outcomes. These studies validate BCU's approach to assessing trends for institutional development.

1.2 The data gathering tool to assess the problems affecting graduate education at BCU

The Problems section identifies major challenges in BCU's graduate education, including leadership gaps, faculty training, program-workforce misalignment, and financial barriers. By measuring these issues, the tool provides data to inform targeted interventions and policy improvements for better quality and accessibility.

Table 2 Quantitative Data Gathering Tool for Assessing the Problems Affecting Graduate Education at BCU

1.2 Problems	Extremely Serious 5	Very Serious 4	Moderately Serious 3	Slightly Serious 2	Not Serious 1
1. The program insufficiently prepares students for leadership roles by offering real-world administrative					

experiences.					
2. Faculty members lack opportunities/training to effectively integrate AI and data-driven decision-making into their instruction.					
3. The program ensures graduates develop industry-relevant skills needed for success in today's workforce.					
4. The current online learning structure ineffectively supports student engagement and career advancement.					
5. Financial instability and rising student debt hinder access to and completion of graduate education.					
6. Inadequate funding compromises the overall quality of graduate education in the institution.					
7. There is a noticeable mismatch between academic programs and labor market needs, affecting graduate employability.					

8. There is uneven distribution of quality across institution's limited equitable access to high-quality graduate education.					
9. Limited job opportunities reduce the perceived value of obtaining a postgraduate degree.					
10. Graduate programs need pedagogical and structural reforms like flexible scheduling to address declining student participation.					

Legend

1.2 Problems			
Numerical Value	**Statistical Limits**	**Descriptive Equivalent**	**Symbol**
5	4.21 - 5.00	Extremely Serious	ES
4	3.41 - 4.20	Very Serious	VS
3	2.61 - 3.40	Moderately Serious	MS
2	1.81 - 2.60	Slightly Serious	SS
1	1.00 - 1.80	Not Serious	NS

The Problems section of the quantitative data gathering tool systematically identifies key issues affecting graduate education at BCU. Respondents rate concerns such as inadequate leadership preparation, insufficient faculty training in technology, financial instability, and misalignment between academic programs and labor market needs. This section reveals persistent barriers to quality and relevance, providing a data-driven foundation for institutional action.

These insights carry critical implications for leadership and policymakers. High ratings on financial instability, limited real-world learning opportunities, and faculty training gaps highlight the need for targeted interventions such as increased funding, faculty development, and curriculum reform. Addressing

these challenges is vital to improving student outcomes, employability, and the competitiveness of BCU's graduate programs. Moreover, the data can inform resource allocation and policy development to enhance equity, access, and innovation.

Research underscores the global nature of these challenges. Guzmán Valenzuela (2023) noted similar issues with funding, quality assurance, and labor market alignment in Latin America. In North America, financial barriers and lack of practical training are common, while Asia-Pacific institutions face gaps between curricula and industry demands. These findings emphasize the importance of systematic assessment and targeted solutions to strengthen graduate education worldwide.

1.3 The data gathering tool to assess the challenges of graduate education at BCU

The Challenges section evaluates difficulties faced by BCU's graduate community, including online engagement, technology access, teaching method adoption, and curriculum-job market alignment. Quantifying these challenges provides actionable insights for leaders to address obstacles and improve program quality and relevance.

Table 3 Quantitative Data Gathering Tool for Assessing the Challenges of Graduate Education at BCU

1.3 Challenges	Extremely Challenging 5	Very Challenging 4	Moderately Challenging 3	Slightly Challenging 2	Not/Least Challenging 1
1. There is limited engagement in fully online classes.					
2. The program does not adequately address real-world skill application.					
3. Access to necessary technology like internet connection is a barrier for some students.					
4. There is a noticeable mismatch between the graduate school					

curriculum and job market needs.					
5. Faculty are slow to adapt to new teaching technologies due to lack of training, resources, or resistance to change.					
6. The program relies heavily on traditional teaching methods.					
7. Reduction on student enrollment are visible in program offerings.					
8. Feedback mechanisms through evaluation of instructional activities, student research and publications, community extension services, and evaluation of faculty are not regularly implemented or considered.					
9. Lack of practical, real-world learning experiences contribute to professional advancement and industry demands.					
10. Program content does not always align with current educational					

leadership challenges.					

Legend

1.3 Challenges			
Numerical Value	**Statistical Limits**	**Descriptive Equivalent**	**Symbol**
5	4.21 - 5.00	Extremely Challenging	EC
4	3.41 - 4.20	Very Challenging	VC
3	2.61 - 3.40	Moderately Challenging	MC
2	1.81 - 2.60	Slightly Challenging	SC
1	1.00 - 1.80	Not Challenging or Least Challenging	NC or LC

The Challenges section of the quantitative tool identifies difficulties faced by graduate students, faculty, and administrators at BCU. Respondents rated issues such as limited online engagement, technology access barriers, slow adoption of new teaching methods, and curriculum misalignment with job market demands. These insights reveal obstacles that may hinder academic success and institutional innovation.

The findings have important implications for leaders and policymakers. High ratings on challenges like technology gaps and insufficient faculty training highlight the need for targeted investments in digital infrastructure and professional development. Addressing these issues is essential to boost student engagement and maintain curriculum relevance. Ongoing assessment can guide resource allocation and strategic planning to keep BCU responsive to its graduate community's evolving needs.

Research supports tackling these challenges. Marcelo et al. (2020) found faculty face barriers to using digital technologies due to lack of training and support, while Atabek (2019) identified insufficient in-service training and inadequate infrastructure as key obstacles. These studies validate BCU's findings and underscore the need for sustained, data-driven solutions.

1.4 The data gathering tool to assess the innovations currently transforming graduate education at BCU

The Innovations section evaluates BCU's use of personalized feedback, AI tools, micro-credentials, new teaching methods, and industry partnerships in graduate programs. By capturing stakeholder views, it offers insights to inform policy, curriculum, and strategy for continuous improvement.

Table 4 Quantitative Data Gathering Tool for Assessing the Innovations Transforming Graduate Education at BCU

1.4 Innovations	**Consistently Applied 5**	**Frequently Applied 4**	**Occasionally Applied 3**	**Rarely Applied 2**	**Not Applied 1**
1. There is limited engagement in fully online classes.					
2. The program does not adequately address real-world skill application.					
3. Access to necessary technology like internet connection is a barrier for some students.					
4. There is a noticeable mismatch between the graduate school curriculum and job market needs.					
5. Faculty are slow to adapt to new teaching technologies due to lack of training, resources, or resistance to change.					
6. The program relies heavily on traditional teaching methods.					
7. Reduction on student enrollment is visible in program offerings.					
8. Feedback mechanisms through evaluation					

of instructional activities, student research and publications, community extension services, and evaluation of faculty are not regularly implemented or considered.					
9. Lack of practical, real-world learning experiences contribute to professional advancement and industry demands.					
10. Program content does not always align with current educational leadership challenges.					

Legend

1.4 Innovations			
Numerical Value	**Statistical Limits**	**Descriptive Equivalent**	**Symbol**
5	4.21 - 5.00	Consistently Applied	CA
4	3.41 - 4.20	Frequently Applied	FA
3	2.61 - 3.40	Occasionally Applied	OA
2	1.81 - 2.60	Rarely Applied	RA
1	1.00 - 1.80	Not Applied	NA

The Innovations section of BCU's quantitative tool assesses the integration and impact of educational innovations such as personalized feedback, AI tools, micro-credentials, innovative pedagogy, and industry partnerships. Research supports their transformative potential: Sajja et al. (2023) introduced an AI assistant for adaptive learning, while Kuzminykh et al. (2024) found that generative AI can deliver feedback comparable to humans, enhancing engagement, aligning with BCU's AI adoption.

Micro-credentials offer flexible, industry-relevant upskilling. Varadarajan et al. (2023) examined their benefits and challenges, noting their role in enhancing employability through certifying competencies and supporting BCU's stackable credentials. Innovative approaches like flipped classrooms and project-based learning enhance engagement; Abedi et al. (2023) demonstrated that large language models and chatbots facilitate self-paced learning and reduce faculty workload, aligning with BCU's teaching goals.

Industry partnerships bridge academic and practical learning; Bruguera et al. (2024) emphasized aligning curriculum with workforce needs, reinforcing BCU's collaborations. Tool results show strong support for AI and micro-credentials, indicating scalability, while lower ratings in other areas point to the need for faculty training and infrastructure. These innovations align with SDG 4, Target 4.3, on equitable access to quality education.

Together, these studies affirm the value of integrating AI, micro-credentials, innovative teaching, and industry ties to advance BCU's graduate education objectives.

Part 2. Qualitative data gathering tool

The qualitative data gathering tool explores BCU stakeholders' experiences in addressing challenges and enhancing graduate education. Using open-ended questions, it captures detailed insights on faculty and administrative support, alignment with industry needs, and the encouragement of research, innovation, and community engagement.

This approach aligns with qualitative research best practices, valuing participant perspectives to inform program development and policy decisions.

This qualitative data gathering tool below answers research question #5

1. What support have you received from faculty and administration to overcome academic and personal challenges as a graduate student?
2. In your experience, how well do BCUs graduate programs prepare you for current industry demands and furthering career advancement?
3. To what extent has your experience at BCU encouraged you to do research publication, creative works, innovative learning and how well-supported have you felt by your mentors, adviser, professors, and college dean in these pursuits?
4. To what extent has your experience at BCU inspired you to participate in community extension services, and how effectively has your mentors, adviser, professors, and college dean supported you in making a positive impact on the communities you serve?

Qualitative insights from BCU stakeholders highlight the vital role of faculty and administrative support in overcoming academic and personal challenges. Effective mentorship, accessible faculty, and responsive services are key to

student success, consistent with broader research on institutional support in graduate education.

BCU's graduate programs also show strong alignment with industry needs by integrating practical skills and real-world applications, boosting graduate employability.

Participants emphasized the value of engaging in research, creative work, and innovative learning as essential for professional growth.

Moreover, BCU's commitment to community extension services promotes social responsibility, encouraging students to apply their knowledge to real-world challenges and contribute meaningfully to society.

Implications

The qualitative insights from BCU have important implications for strategic planning and policy. Enhancing faculty and administrative support systems will improve student experiences and outcomes. Continuous curriculum evaluation and stronger industry partnerships are crucial to keep graduate programs relevant and competitive.

Promoting research and creative activities fosters academic excellence, innovation, and critical thinking. Institutional backing through dedicated funding, workshops, and mentorship can strengthen these areas. Integrating community extension services into the curriculum enriches learning and encourages civic engagement, with structured programs enabling students to apply skills meaningfully.

These findings align with broader graduate education research emphasizing accessible faculty support, curriculum-industry alignment, and the role of mentorship in student engagement. Community involvement also promotes social responsibility and practical learning, reinforcing the importance of holistic support, relevant curricula, and active research and community engagement in graduate education.

Effectiveness and relevance of the data gathering tool

The results confirm that the newly developed questionnaire is both reliable and contextually appropriate. The quantitative component, using clearly structured Likert scales, effectively captured stakeholder views on global trends (e.g., UN SDGs, technology use, flexible learning), persistent challenges (e.g., financial instability, skills gaps), and applied innovations (e.g., micro-credentials, AI-enhanced learning). High response rates and strong internal consistency (Cronbach's alpha > 0.80) underscore the tool's accessibility and reliability. Meanwhile, the qualitative section generated rich, detailed accounts of stakeholder experiences, offering valuable insights into institutional support, career readiness, research engagement, and community involvement. Together, the quantitative and qualitative results demonstrate the tool's strength in holistically assessing the complexities of graduate education.

Insights into trends, problems, challenges, and innovations

Analysis of the data highlights several key trends in BCU's graduate education. Stakeholders recognized strong alignment with global priorities, including the integration of sustainable development goals, personalized and hybrid learning, and data-driven academic advising. Persistent challenges include inadequate funding, limited opportunities for real-world skill development, and the need for pedagogical reforms to boost enrollment and workforce relevance. Technology access issues, slow faculty adoption of new methods, and weak feedback systems were also noted. Conversely, innovations in teaching, curriculum, and industry partnerships were credited with enhancing learning outcomes and employability. Qualitative responses underscored the importance of mentorship, research support, and community engagement in fostering a dynamic and responsive graduate education environment.

Implications for practice and future research

The successful development and validation of this data gathering tool have key implications for institutional practice and future research. For BCU and similar institutions, it offers a reliable means for ongoing assessment and evidence-based decision-making in program design, resource use, and policy development. Its mixed-methods design—blending quantitative trends with qualitative insights—supports strategic leadership and innovation.

The study underscores the importance of regularly updating such tools to reflect evolving educational contexts and stakeholder needs. Future research could explore longitudinal use, cross-institutional comparisons, and the inclusion of metrics like graduate outcomes and employer feedback to broaden its utility.

In summary, this study affirms the value of a context-sensitive, well-designed instrument that captures the complexities of graduate education. By combining rigor and depth, it provides actionable insights into trends, problems, challenges, and innovations, empowering institutions to drive continuous improvement and enhance the quality and relevance of graduate programs.

IV. Conclusion and recommendations

This study successfully designed and validated a comprehensive data gathering tool to assess trends, problems, challenges, and innovations in graduate education at BCU. Using a mixed-methods approach, it captured diverse stakeholder perspectives. Findings show BCU's responsiveness to global trends like technology integration and flexible learning while highlighting persistent issues such as funding gaps and limited practical experience. The tool also revealed how stakeholders address these challenges through innovation. Overall, it proved reliable, contextually relevant, and valuable for evidence-based decision-making.

Recommendations include

1. Institutionalize the Tool – Adopt the validated data gathering tool for routine assessments to monitor trends, identify persistent problems and challenges, and evaluate ongoing innovations in graduate education.
2. Leverage Data for Improvement – Utilize findings to inform targeted program enhancements, including faculty development in digital pedagogy, expanded industry collaboration, and strengthened student support for financial and tech-related issues.
3. Promote Stakeholder Engagement – Use the tool's qualitative component to facilitate regular dialogue among students, faculty, and administrators, fostering feedback and shared problem-solving.
4. Inform Policy and Strategy – Support institutional leaders in crafting responsive policies and strategic plans that address both short-term needs and long-term goals.
5. Ensure Tool Relevance – Periodically review and revise the instrument to keep it aligned with changing institutional priorities and stakeholder expectations.

Future research should adapt and apply the tool in diverse higher education contexts to enable cross-institutional comparisons and broader validation. Longitudinal studies should assess intervention impacts over time, while incorporating alumni and employer input to further refine curricula and enhance program effectiveness.

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INPUT (Foundational Elements for Tool Design)	**PROCESS (Tool Design and Development)**	**OUTPUT (Study Outcomes)**
Existing knowledge and literature on graduate education trends, problems, challenges, and innovations (global and local). Literature Review and Conceptual Framework Development (synthesizing inputs related to graduate education landscape and tool design). Specific context and characteristics of BCU's graduate education (as understood through initial scope and available information).	Literature Review and Conceptual Framework Development (synthesizing inputs related to graduate education landscape and tool design). Identification of Key Constructs/Variables related to trends, problems, challenges, and innovations in graduate education at BCU based on SOP and RQs. Development of Data Gathering Tool Items/Sections (drafting questions and structuring the tool based on identified constructs).	A validated and comprehensive Data Gathering Tool designed to assess trends, problems, challenges, and innovations in graduate education at BCU. A conceptual framework or guide for using the tool to understand the complexities of graduate education at BCU. Potential initial insights gained during the tool design and validation process.