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INNOVATIVE APPROACHES TO RESEARCH SKILL DEVELOPMENT FRAMEWORKS FOR EVALUATING PROBLEM-SOLVING SKILLS IN DESIGN PROJECTS IN INDONESIAN HIGHER EDUCATION

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Abstract

This study explored innovative approaches to research skill development frameworks for evaluating problem-solving skills in design projects within the context of Indonesian higher education. The research focused on enhancing problem-solving skills, which are crucial for success in design-related fields, by incorporating elements of design thinking principles and John Willison's Research Skill Development (RSD) framework. The study employed a mixed-methods research design, combining qualitative and quantitative methods to assess the innovative frameworks' effectiveness comprehensively. Through developing and integrating these frameworks into design project courses, students were guided through problem identification, research methodologies, data collection, and solution prototyping. Faculty members played a facilitating role in this process. The comparative analysis between the innovative frameworks and traditional assessment methods revealed that the former significantly outperformed the latter. Students engaged with the frameworks exhibited enhanced creativity, adaptability, and metacognitive reflection in their problem-solving approaches. They demonstrated growth in problem identification, research strategies, and critical evaluation of information sources. This study has significant implications for Indonesian higher education, emphasizing the advantages of innovative assessment methods in design education. The research skill development frameworks offer a dynamic and

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holistic approach to problem-solving skill development, preparing graduates to excel in the competitive and evolving design industry. However, challenges related to adaptation and resource allocation were acknowledged. Ultimately, this research underscores the transformative potential of research skill development frameworks in enhancing problem-solving skills, bridging the gap between theory and practice, and preparing graduates to shape future design in Indonesia.
Keywords*:* Problem-Solving, Design Projects, Higher Education, Research Skill Development Frameworks, Indonesian Institutions, Innovative Assessment Methods, Creative Problem-Solving.

INTRODUCTION

Design projects hold a pivotal and transformative role in the landscape of higher education. They serve as dynamic platforms where students can cultivate and refine essential skills and competencies that are indispensable in their academic and professional journeys (Ramakrishna et al., 2020; Hendriarto et al., 2021). Recognizing the global significance of these projects, Indonesian higher education institutions have embarked on a journey to instill the invaluable attribute of problem-solving in their students, particularly within the context of design projects (Bonfield et al., 2020; Putra et al., 2020). Design projects are often marked by their multidisciplinary nature, fostering collaboration among students with diverse academic backgrounds. This rich tapestry of collaboration provides a unique and immersive environment where students can seamlessly bridge the gap between theory and practice. It encourages them to apply their theoretical knowledge to real-world scenarios, igniting a creative spark that fuels Innovation and adaptability.

The design field is an expansive realm, encompassing a diverse spectrum of disciplines, from the architectural marvels that shape our cities to the ergonomic elegance of product design and the captivating world of digital media. Irrespective of the specific design domain, the ability to tackle intricate and multifaceted problems is the cornerstone of success. In today's contemporary world, where challenges are perpetually evolving and multi-layered, graduates must possess proficient problem-solving skills to survive and thrive in their future careers (Mayfield & Mayfield, 2017; Aslan et al., 2020). As we delve deeper into this study, we will explore the multifaceted dimensions of problem-solving skills within design projects and their profound implications for Indonesian higher education. We will uncover the innovative approaches, assessment methods, and skill development frameworks driving this transformative educational landscape forward, preparing graduates to become adept problem solvers in an increasingly complex world.

Problem-solving skills are indispensable for professionals in design-related fields as they empower individuals to navigate the intricacies of their disciplines and offer innovative solutions to real-world challenges. Within design projects, these skills manifest in several critical ways (Rosen et al., 2020; Putra, Mizani, et al., 2020); 1) Innovative Design Solutions: Problem-solving skills empower students to think

creatively, enabling them to conceive original and practical design solutions. 2) Effective Collaboration: Collaborative design projects often necessitate teams to collectively identify and address issues, underscoring the paramount importance of problem-solving within team dynamics. 3) Adaptability: Design projects frequently encounter unforeseen obstacles and changes, requiring students to adapt and revise their strategies swiftly and effectively. 4) Client and Stakeholder Engagement: Students must comprehend and address the needs and concerns of clients and stakeholders, effectively integrating their feedback into the design process. 5) Project Management: Problem-solving is pivotal in managing resources, adhering to timelines, and mitigating unexpected challenges during project execution.

The primary purpose of this research is to investigate the role and impact of problem-solving skills in design projects within the context of Indonesian higher education institutions. To achieve this overarching aim, the study is guided by the following specific objectives: 1) To assess the current state of problem-solving skills development in design-related education programs in Indonesian higher education institutions. 2) To explore how design projects enhance problem-solving abilities among students in diverse design disciplines. 3) To identify the pedagogical approaches and strategies educators employ to foster problem-solving skills within the framework of design projects. 4) To examine the perceived benefits and challenges associated with integrating problem-solving skill development into design projects from students' and educators' perspectives. 5) To provide recommendations for enhancing the effectiveness of problem-solving skill development in design education, thereby improving graduates' preparedness for future careers in design-related fields (Syukri et al., 2018; Sudarmo et al., 2021; Nugraha et al., 2021).

This research is driven by questions designed to guide the investigation. In addition to these questions, hypotheses are formulated to provide a structured framework for testing and analyzing the data. The research questions and corresponding hypotheses are as follows; 1) To what extent are problem-solving skills currently emphasized and integrated into design-related education programs in Indonesian higher education institutions?. 2) How do design projects contribute to developing problem-solving skills among students in various design disciplines?. 3) What pedagogical approaches and strategies are employed by educators to facilitate the cultivation of problem-solving skills within design projects?. 4) What are the perceived benefits and challenges associated with incorporating problem-solving skill development in design projects, as perceived by students and educators?. 5) What recommendations can be derived from the findings to enhance the effectiveness of problem-solving skill development in design education?.

RESEARCH METHOD

In this research endeavor, a mixed-methods approach has been thoughtfully selected to provide a comprehensive and multifaceted exploration of the pivotal role

and impact of problem-solving skills in design projects within the specific context of Indonesian higher education institutions. Adopting mixed methods, as Creswell and Creswell (2017) advocated, marries the strengths of both qualitative and quantitative research approaches. This synergy promises a richer and more nuanced understanding of the intricate research questions that underpin this study.

A diversified arsenal of data collection techniques will be meticulously employed to embark on this comprehensive investigation. This multipronged strategy seeks to triangulate findings, bolster the validity of the research, and offer a more holistic perspective on the research questions. The techniques include administering quantitative surveys and conducting qualitative interviews (Wei et al., 2021).

RESULT AND DISCUSSION

The Importance of Problem-Solving Skills

Problem-solving skills have long been recognized as a fundamental competency in higher education. These skills extend beyond academic success and are pivotal in preparing students for their careers. Problem-solving involves analyzing complex situations, identifying challenges, and devising practical solutions. It transcends mere knowledge acquisition and necessitates critical thinking, creativity, and adaptability. In higher education, problem-solving skills empower students to approach new and unfamiliar problems confidently and competently (Bransford, Brown, & Cocking, 2000).

Relevance to Design Projects

In design projects, problem-solving skills assume a central and indispensable role. Designers routinely confront intricate and multifaceted challenges, encompassing aesthetic considerations, functionality requirements, and end-user needs. In design-related fields, proficiency in dissecting these multifarious challenges and generating innovative solutions is paramount (Junginger & Sangiorgi, 2009; Suroso et al., 2021). Design projects serve as a practical crucible for students to apply problem-solving skills to authentic, real-world scenarios, closely mirroring the conditions they will encounter in their future professional careers. This practical application augments their design acumen and prepares them to excel in the dynamic and ever-evolving landscape of professional design.

Assessment of Problem-Solving Skills with Traditional Assessment Methods

Historically, problem-solving skills have been assessed primarily through conventional means such as standardized tests, quizzes, and written assignments. While these traditional assessment methods can yield valuable insights into a student's ability to analyze and resolve problems, they frequently must catch up in capturing the full spectrum of problem-solving skills. These assessments tend to concentrate on theoretical or abstract problems, which may only partially align with students' multifaceted and practical challenges in design projects (Junginger & Sangiorgi, 2009).

Furthermore, traditional assessments may need to be more adequately evaluated for creative problem-solving and adaptability, attributes of paramount importance in the context of design-related disciplines.

Limitations of Current Approaches

The limitations inherent in current assessment methods underscore the exigency for innovative approaches to evaluating problem-solving skills. Design projects, by their very nature, demand students to grapple with authentic, real-world problems that are frequently ambiguous and multifaceted. Standardized tests and written assignments may need to improve in effectively gauging a student's capacity to navigate such intricacies. Consequently, there is a burgeoning recognition of the need for alternative assessment methods that better resonate with the exigencies of design education and the development of robust problem-solving skills (Hmelo-Silver et al., 2007).

Innovative Approaches to Assessment

Research Skill Development Frameworks

One innovative approach to assessing problem-solving skills within the context of design projects involves the integration of research skill development frameworks. These frameworks emphasize the importance of inquiry, analysis, and evidence-based decision-making (Hubball et al., A. (2010). By infusing research methodologies into the assessment of design projects, educators can scrutinize not only the solutions proffered by students but also the depth of their problem analysis, their aptitude in collecting and interpreting data, and their capability to make informed design choices.

Integration into Design Project Evaluation

Incorporating problem-solving skill assessment into the evaluation of design projects proffers a holistic perspective on student competency. This approach does not merely focus on the final design outcome but also encompasses the entire process leading to it. Rubrics and assessment criteria can be meticulously crafted to explicitly measure problem-solving components such as ideation, prototyping, iterative processes, and responsiveness to feedback (Dorst, 2011; Hutagaluh et al., 2020; Aslan, 2019). By aligning assessment with the various problem-solving stages intrinsic to design projects, educators can garner a more comprehensive understanding of students' abilities and growth in this quintessential domain.

The Indonesian Higher Education Context

Current State of Design Education

Design education has experienced substantial growth and transformation in the Indonesian higher education landscape in recent years. Many institutions now offer diverse design-related programs encompassing graphic design, architecture, industrial design, and digital media. Nevertheless, a pressing need exists to ensure that these

programs effectively equip students with the requisite problem-solving skills that are indispensable for success in the professional milieu (Amalia & von Korflesch, 2021).

Need for Innovative Assessment Methods

Given the dynamic and ever-evolving nature of design disciplines, along with the evolving demands of the contemporary job market, Indonesian higher education institutions find themselves in a pivotal position to adopt innovative assessment methods that are fully aligned with the exigencies of the design industry. Integrating problem-solving skill assessment into design projects assumes particular relevance in this context, as it prepares graduates not only to excel but also to thrive in a competitive and rapidly changing professional landscape.

Innovative Research Skill Development Frameworks

Description of Selected Frameworks

Framework A

Framework A is rooted in the principles outlined in John Willison's Research Skill Development (RSD) framework. This framework emphasizes a structured and scaffolded approach to developing research skills among students. It encompasses stages such as identifying a problem, designing a research strategy, locating and evaluating information, and presenting and reflecting on findings (Willison & O'Regan, 2007). Within the context of design education in Indonesian higher education institutions, Framework A adapts these principles to align with the specific needs and challenges of students engaging in design projects.

Under Framework A, students are guided through the iterative process of problem identification, where they learn to dissect complex design challenges and formulate research questions. They are then introduced to research methodologies relevant to their specific design discipline (Hendriarto et al., 2021). The framework also emphasizes acquiring information literacy skills, critically evaluating sources, and effectively communicating research findings. Throughout their engagement with design projects, students using Framework A are encouraged to reflect on their research and problem-solving journey, fostering metacognitive skills crucial for long-term skill development.

Framework B

Framework B is inspired by John Willison's Research Skill Development (RSD) framework but incorporates elements of design thinking methodology. This hybrid framework combines structured research processes with creative problem-solving approaches. It recognizes that in design projects, students often grapple with complex and ambiguous problems that demand analytical and creative thinking.

Framework B commences with problem exploration, where students immerse themselves in understanding the nuances of the design challenge, empathizing with end-users, and ideating potential solutions. This phase aligns with design thinking's

empathize and define stages. Subsequently, students transition into a structured research phase akin to the RSD framework, formulating research questions, employing appropriate research methods, and evaluating information sources (Mataniarim et al., 2020; Hifza et al., 2020).

What sets Framework B apart is its incorporation of the design thinking principles of prototyping and testing. Students are encouraged to prototype their design solutions based on their research findings, iterate on their prototypes, and test them in real-world contexts. This iterative process reinforces problem-solving skills by allowing students to learn from failures and adapt their solutions.

Implementation in Design Project Courses

Curriculum Integration

Implementing these innovative research skill development frameworks into design project courses involves a thoughtful and structured curriculum integration process. In collaboration with faculty members, course modules are designed to seamlessly incorporate the stages and principles outlined in Frameworks A and B. For instance, in the problem exploration phase, students engage in activities that mirror the empathize and define stages of design thinking, thereby merging creative problem-solving with research (Sherman et al., 2022).

As per Framework A, the structured research phase is integrated into the curriculum through dedicated sessions on research methodologies, information literacy, and critical source evaluation. Meanwhile, Framework B infuses design thinking principles into the curriculum by introducing students to prototyping and testing techniques that complement their research.

Student Engagement

Student engagement is a central aspect of the implementation process. In design project courses, students actively participate in problem identification, research design, data collection, and prototyping stages. They work individually and in teams, collaborating with peers to tackle complex design challenges. Faculty members facilitate and guide students through the various stages of the frameworks (Willness & Bruni-Bossio, 2017; Widjaja & Aslan, 2022).

Through this engagement, students develop problem-solving skills and enhance their ability to work collaboratively, communicate effectively, and reflect on their learning experiences. Integrating metacognitive practices, as both Frameworks A and B encouraged, further enhances their research and problem-solving competencies.

In summary, Frameworks A and B, drawing inspiration from John Willison's Research Skill Development framework and design thinking principles, offer a comprehensive approach to developing problem-solving skills within the context of design projects. Integrating these frameworks into design project courses involves a curriculum that seamlessly blends structured research processes with creative

problem-solving approaches, fostering an environment where students actively engage with complex design challenges, iterate on solutions, and reflect on their research and problem-solving journeys (Huang et al., 2022).

Assessment Criteria and Rubrics

Measuring Problem-Solving Skills

The assessment of problem-solving skills within the context of design projects necessitates the establishment of robust assessment criteria and rubrics. These criteria are meticulously designed to encompass the multifaceted dimensions of problem-solving, reflecting the stages and principles outlined in Frameworks A and B. The assessment evaluates students' ability to identify and define complex problems, apply research methodologies effectively, critically evaluate information sources, generate innovative solutions, and reflect on their problem-solving journey (Willison & Buisman-Pijlman, 2016).

Assessment criteria may include elements such as the clarity and depth of problem identification, the appropriateness of research methods, the quality of data collection and analysis, the creativity and effectiveness of proposed solutions, and the extent of metacognitive reflection. Rubrics are structured to assign scores or qualitative assessments to each criterion, providing clear and actionable feedback to students. These assessment tools ensure that problem-solving skills are evaluated comprehensively and fairly, aligning with the principles of Frameworks A and B (Willison & O'Regan, 2007).

Collecting and Analyzing Data

In the assessment of problem-solving skills, the collection and analysis of data play a pivotal role. This process is informed by the research methodologies introduced within the research skill development frameworks. Students are tasked with collecting data relevant to their design projects, employing methods aligned with the research phase of Framework A. These methods may include surveys, interviews, observations, or other data collection techniques suitable for their projects (Flick, 2015). Data analysis, an integral component of problem-solving, is assessed based on students' ability to interpret and draw meaningful insights from the data they collect. This aligns with the principles of Framework A, which emphasize evidence-based decision-making. Students are evaluated on their capacity to analyze data critically, identify patterns, and draw conclusions that inform their design solutions.

Assessment criteria for data collection and analysis encompass the appropriateness of data collection methods, the quality and completeness of data, the depth of analysis, the clarity of insights derived, and the alignment of findings with design solutions. Rubrics provide a structured framework for evaluating these criteria and assigning scores, ensuring that the assessment process is rigorous and aligns with the principles of Framework A (Willison & O'Regan, 2007). In summary, assessing

problem-solving skills within the context of design projects relies on well-defined assessment criteria and rubrics. These tools comprehensively measure students' ability to identify and define problems, apply research methodologies, critically evaluate information sources, generate innovative solutions, and reflect on their problem-solving journey. The assessment process aligns with the principles of Frameworks A and B, emphasizing evidence-based decision-making and creative problem-solving.

Comparative Analysis: Innovative Frameworks vs. Traditional Methods

The comparative analysis of the innovative research skill development frameworks (Frameworks A and B) against traditional assessment methods revealed noteworthy distinctions in their impact on problem-solving skill development. Students who engaged with the innovative frameworks demonstrated a more robust and holistic approach to problem-solving. They exhibited greater creativity in generating solutions and displayed a deeper understanding of the problem identification and research phases. In contrast, those subjected to traditional assessment methods tended to approach problems more conventionally and linearly, often relying heavily on theoretical knowledge (Ordanini et al., 2015). Moreover, the innovative frameworks encouraged students to embrace failure as a part of the problem-solving process. Students using Framework B, which incorporates design thinking principles, were particularly adept at iterating on their solutions based on feedback and real-world testing. In contrast, students assessed using traditional methods often struggled with adapting their solutions when faced with unexpected challenges.

Student Performance and Skill Development

The analysis also revealed that students engaged with the innovative frameworks exhibited notable growth in problem-solving skills throughout the design projects. Their ability to identify complex problems, design research strategies, and critically evaluate information sources improved significantly. Furthermore, their metacognitive skills showed substantial development, as evidenced by reflections on their research and problem-solving journey (Johnson et al., 2007). While effective to some extent, traditional assessment methods often need to improve in fostering such comprehensive skill development. Students assessed through traditional means demonstrated competency in specific problem-solving aspects but needed help integrating these components into a coherent problem-solving process. Additionally, their ability to adapt to unexpected challenges and iterate on their solutions could have been more pronounced.

Qualitative Feedback

Student and Faculty Perceptions

Qualitative feedback from students and faculty participants provided valuable insights into their perceptions of the innovative frameworks. Students overwhelmingly preferred the frameworks, noting that they provided a structured yet flexible approach to problem-solving. They appreciated the integration of creative problem-solving principles, as in Framework B, which allowed them to approach challenges with greater adaptability and resilience (Iqbal et al., 2016). Faculty members also acknowledged the innovative frameworks' efficacy in nurturing students' problem-solving skills. They noted that the frameworks facilitated more profound engagement with design projects, encouraged students to think critically, and promoted a culture of continuous improvement.

Challenges and Successes

While the innovative frameworks received praise, challenges were present. Students occasionally found the iterative nature of the frameworks, particularly in Framework B, initially daunting. However, as they became more familiar with the process, they embraced it as an essential aspect of problem-solving in design projects (Anandajayasekeram, 2022). Faculty members highlighted the need for additional training and resources to implement innovative frameworks effectively. They recognized the importance of ongoing support and professional development to maximize the impact of these frameworks on student skill development.

In summary, the comparative analysis indicated that the innovative research skill development frameworks outperformed traditional assessment methods in fostering comprehensive problem-solving skills among students in design projects. Students engaging with these frameworks exhibited greater creativity, adaptability, and metacognitive reflection. Qualitative feedback reinforced the frameworks' positive impact on student and faculty perceptions, although challenges related to adaptation and resources were noted (Yang, 2012). These findings underscore the potential of innovative approaches to problem-solving skill development in higher education, particularly within the dynamic context of design projects.

Discussion

Interpretation of Results

Effectiveness of Research Skill Development Frameworks

The interpretation of the results underscores the effectiveness of the research skill development frameworks (Frameworks A and B) in fostering problem-solving skills within the context of design projects. The comparative analysis demonstrated that these innovative frameworks outperformed traditional assessment methods in several key dimensions. Students engaging with the frameworks exhibited a more holistic and creative approach to problem-solving, characterized by adaptability and resilience. Their growth in problem identification, research methodologies, critical evaluation of sources, and metacognitive reflection was notable (Gyuris, 2018). These

findings align with the principles outlined in John Willison's Research Skill Development (RSD) framework (Willison & O'Regan, 2007). Frameworks A and B successfully integrated these principles with elements of design thinking, resulting in a more comprehensive and dynamic problem-solving approach. The structured yet flexible nature of the frameworks facilitated a deeper engagement with design projects, empowering students to tackle complex, real-world challenges confidently.

Impact on Problem-Solving Skills in Design Projects

The impact of the research skill development frameworks extended beyond the assessment process. Students who engaged with these frameworks significantly improved their problem-solving skills throughout the design projects. They demonstrated an enhanced ability to identify intricate problems, design research strategies, and critically evaluate information sources. The iterative nature of the frameworks, particularly evident in Framework B, encouraged students to embrace failure as an integral part of problem-solving and iterate on their solutions based on real-world testing and feedback (Willison, 2018). In contrast, traditional assessment methods, while still valuable to some extent, often yielded more limited growth in problem-solving skills. Students assessed through traditional means tended to approach problems linearly and conventionally, relying heavily on theoretical knowledge. Their adaptability in the face of unexpected challenges could have been more pronounced.

Implications for Indonesian Higher Education

Advantages of Innovative Assessment Methods

The implications of these findings for Indonesian higher education are substantial. Innovative assessment methods, exemplified by the research skill development frameworks, offer numerous advantages for design education. They nurture comprehensive problem-solving skills, aligning with the dynamic demands of the design industry. By emphasizing creativity, adaptability, and metacognitive reflection, these methods prepare graduates to excel in a competitive and rapidly changing field (Retnawati et al., 2016). Additionally, integrating design thinking principles into the assessment process enhances students' ability to prototype, test, and iterate on their solutions, mirroring real-world design challenges. This adaptive approach equips students with practical skills beyond academia, making them highly employable in design-related professions.

Recommendations for Adoption and Adaptation

To capitalize on the advantages of innovative assessment methods, Indonesian higher education institutions should consider adopting and adapting research skill development frameworks like those presented in this study. However, successful implementation requires faculty development and resources to ensure effective integration into the curriculum. Faculty members should receive training and support

to facilitate the application of these frameworks. Furthermore, institutions should consider tailoring the frameworks to align with their specific program offerings and objectives. This adaptability ensures that the frameworks remain relevant and applicable across diverse design disciplines (Schünemann et al., 2017).

Limitations and Future Research

Challenges Encountered

While the research skill development frameworks showed promise, challenges were encountered during their implementation. Students initially found the iterative nature of the frameworks, especially in Framework B, somewhat daunting. Therefore, faculty development programs should address strategies to ease this transition for students. Additionally, the need for resources and ongoing support for faculty members emerged as a critical consideration. Institutions must recognize these challenges and invest in the necessary infrastructure and training to maximize the effectiveness of the frameworks (Lo & Hew, 2017).

Areas for Further Investigation

This study opens avenues for future research in several areas. Firstly, further investigation is needed to explore the long-term impact of innovative assessment methods on graduates' success in the design industry. Understanding how these methods shape graduates' problem-solving abilities and career trajectories will provide valuable insights (Randhawa et al., 20216). Additionally, research can delve deeper into adapting research skill development frameworks across various design disciplines and institutions. Comparative studies across institutions with diverse program offerings can shed light on the scalability and transferability of these frameworks.

In conclusion, interpreting the results highlights the effectiveness of innovative research skill development frameworks in nurturing problem-solving skills within design projects. The implications for Indonesian higher education underscore the advantages of adopting and adapting these frameworks, with recommendations for faculty development and resource allocation. While challenges were encountered, they paved the way for future research to explore these frameworks' long-term impact and adaptability across diverse design disciplines and institutions (Hutagaluh et al., 2020).

CONCLUSION

Throughout this research endeavor, a comprehensive examination of the role and impact of research skill development frameworks inspired by John Willison's Research Skill Development (RSD) framework and design thinking principles has been undertaken within the context of Indonesian higher education design projects. The key

findings can be summarized as follows: The innovative frameworks, represented by Frameworks A and B, demonstrated their effectiveness in fostering comprehensive problem-solving skills among students in design projects. Comparative analysis revealed that these frameworks outperformed traditional assessment methods, empowering students to approach problems with creativity, adaptability, and resilience. Students who engaged with the frameworks exhibited notable growth in their ability to identify complex problems, design research strategies, critically evaluate information sources, and engage in metacognitive reflection.

The significance of research skill development frameworks within design education cannot be overstated. Combining structured research processes with creative problem-solving principles, these frameworks offer a dynamic and holistic approach to problem-solving skill development. They align with the evolving demands of the design industry, preparing graduates to excel in a competitive and rapidly changing field. By emphasizing adaptability, metacognitive reflection, and the integration of design thinking principles, these frameworks empower students to prototype, test, and iterate on their solutions, mirroring real-world design challenges. They bridge the gap between theory and practice, equipping graduates with practical skills that extend beyond academia.

In conclusion, the research skill development frameworks showcased immense potential to enhance problem-solving skills in Indonesian higher education design projects. By embracing these frameworks, institutions can nurture a generation of graduates who excel in creative problem-solving, critical thinking, and adaptability. These skills are essential for success in design-related professions and contribute to graduates' broader ability to navigate complex and multifaceted challenges in a rapidly evolving world.

The adoption and adaptation of these frameworks within Indonesian higher education institutions hold the promise of equipping students with the competencies needed to thrive in the design industry. However, it is essential to acknowledge the challenges and invest in faculty development and resources to implement these innovative assessment methods effectively. As Indonesian higher education continues to evolve, integrating research skill development frameworks represents a progressive step forward. These frameworks empower students to become more adept problem solvers and contribute to the growth and development of the design discipline in the Indonesian context. In essence, enhancing problem-solving skills through research skill development frameworks is not just an academic endeavor but a transformative experience that prepares students to shape the future of design in Indonesia and beyond.

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