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DESIGN-BASED THINKING INTENTIONS AMONG SECONDARY STUDENT-TEACHERS: IMPLICATIONS TO INSTRUCTIONAL DELIVERY

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Abstract

As future educators, student-teachers must execute the needed deliverables as instructional implementers. However, many still need help once deployed in their respective cooperating schools due to the strenuous tasks they need to do, especially in selecting, designing, developing, and evaluating learning resources. With that in mind, the primordial intention of the study is to examine the design-based thinking intentions among secondary student-teachers deployed in various secondary schools in the divisions of Bataan and Balanga City and implicate the results to instructional delivery. It specifically examines the profile of student-teachers in terms of sex, area of specialization, and location of cooperating school; determines the design-based thinking intentions of student-teachers in terms of understanding (empathizing and defining), exploring (ideating and prototyping), and materializing (testing and implementing); and determines the implications of the findings to effective instructional delivery. Using the descriptive-developmental design of quantitative research, the data are gathered from 172 out of 199 student-teachers under the

College of Education (COEd) who are randomly selected. The primary data-gathering tool used in the study is an adopted survey questionnaire. The quantitative data gathered from the study will be analyzed using descriptive statistics (i.e., frequency count, percentage, mean, and standard deviation) and inferential statistics (i.e., T-test and F-test/ANOVA). The results indicate that most respondents are female, majoring in Filipino, English, and Social Studies, and deployed in rural schools. The student-teachers exhibit a high level of design-based thinking intentions across all domains. Also, significant differences are noted in the design-based thinking intentions of student-teachers when grouped according to their profile.

INTRODUCTION

The concept of Design Thinking (DT) is introduced as a potential solution. DT is a human-centered, iterative process that fosters problem-solving through empathy, creativity, and collaboration (Bene & McNeilly, 2020).

However, the effectiveness of Design-Based Learning (DBL) in higher education is questioned. Delen and Sen (2022) suggest that while it aids student achievement, there is a lack of convincing evidence on transferring these gains to other situations. Furthermore, there are challenges in meeting the demands for design-based learning, especially in instructional design and technology integration (Bain, 2020). Ogbu (2015) and Jimenez and Csee (2020) highlight the need for teachers to improve the availability and quality of learning resources.

Despite recognizing DBL as a critical approach, it still needs to be determined which dimensions of design thinking mindsets support conceptual learning (Ladachart et al., 2022). Implementing allied teaching practices, often project-based learning, poses challenges (Chiu et al., 2021). While design thinking is increasingly essential in integrated STEM education (Chiu et al., 2021; Jackson et al., 2021; Charosky et al., 2022; McCurdy et al., 2020), its application in non-STEM education, particularly in the experience of student-teachers, is limited.

The study also emphasizes its intention to contribute to Sustainable Development Goal (SDG) No. 4: Quality Education, aiming to promote lifelong learning opportunities, improve literacy and numeracy skills, and enhance education worldwide. By exploring student-teachers' intentions in utilizing design-based thinking, the study could provide insights into strategies, empowering further educators to create engaging and inclusive learning environments, ultimately promoting better educational outcomes and supporting the progress toward achieving SDG 4.

Given these realities, the researchers aim to explore the design-based thinking intentions among secondary student teachers in Bataan and Balanga City schools and apply the findings to improve instructional delivery. The study looks at the student-teachers' profiles, including sex, area of specialization, and school location. It also examines their design-based thinking intentions in terms of understanding, exploring, and materializing. Finally, the study aims to determine the implications of the findings for effective instructional delivery. The study analysis could provide meaningful information on effectively utilizing various instructional design models to develop teaching-learning resources and better prepare student teachers for their roles as educators.

METHODS

The study utilized the descriptive survey design of quantitative research to analyze the design-based thinking intentions of secondary student-teachers deployed in various secondary schools in the Bataan and Balanga City divisions. The Raosoft Sampling Calculator was used to identify the exact sample among the target student-teachers. The sample sizes for the study were determined as follows: 53 out of 60 English majors, 61 out of 71 Filipino majors, and 58 out of 68 Social Studies majors. Thus, 172 out of 199 student-teachers were randomly selected using a randomizer to participate in the study. Meanwhile, the primary data-gathering tool in the study was an adopted survey questionnaire (Pecson & Romero, 2023) with a reliability index of 0.9759, making it highly reliable among the target respondents. It contained two parts: the profile of student-teachers in terms of sex, area of specialization, and location of cooperating school; and the design-based thinking intentions of student-teachers in terms of understanding (empathizing and defining), exploring (ideating and prototyping), and materializing (testing and implementing). The quantitative data gathered from the study were analyzed using descriptive statistics (i.e., frequency count, percentage, mean, and standard deviation) and inferential statistics (i.e., T-test and F-test/ANOVA).

RESULTS AND DISCUSSIONS

Profile of Student-Teachers

Table 1

Profile of Student-Teachers

Sex	***f***	*%*	**Area of Specialization**	***f***	*%*	**Location of Cooperating School**	***f***	*%*
Female	130	75.58	English	53	30.81	Rural	114	66.28
Male	42	24.42	Filipino	61	35.47	Urban	58	33.72
Total	**172**	**100.00**	Social Studies	58	33.72	**Total**	**172**	**100.00**
			Total	**172**	**100.00**			

Table 1 presents student-teacher profiles based on sex and area of specialization. Among the student-teachers, 130 (75.58%) were female, while 42 (24.42%) were male. This is consistent with previous research indicating that the teaching profession is predominantly female (OECD, 2019). Regarding their area of specialization, 53 (30.81%) were English majors, 61 (35.47%) were Filipino majors, and 58 (33.72%) were Social Studies majors. The high preference of student-teachers for language majors is due to the rising demand for language teachers, especially English (Schmidt, 2021). As for the distribution of student-teachers cooperating schools based on location, 114 (66.28%) were deployed in rural schools, while 58 (33.72%) were deployed in urban schools. This also reflects the reality that many teachers are stationed in rural schools where they experience more hardships (Teach for the Philippines, Inc., 2020).

Design-Based Thinking Intentions among Student-Teachers

Table 2

Design-Based Thinking Intentions among Student-Teachers

Domains | Items	Intentions		
	Mean	**Std. Dev.**	**Interpretation**
A. Understanding	**3.70**	**0.53**	**Very High**
A.1 Empathizing	**3.65**	**0.54**	**Very High**
1. Conduct thorough research about the learners to gain a deep understanding of their behavior, personality, and characteristics.	3.59	0.57	Very High
2. Conduct a needs assessment of learners to profile them academically, ensuring awareness of their individual educational requirements.	3.62	0.53	Very High
3. Engage in active listening and observe the learners' interactions to empathize with their feelings, concerns, and perspectives.	3.74	0.51	Very High
A.2 Defining	**3.74**	**0.51**	**Very High**
1. Identify the specific needs of the learners, allowing them to meet such at their current level and build from there.	3.74	0.51	Very High
2. Pinpoint the root cause of any problems, issues, or concerns the learners may have, aiming to comprehend their perspective and where they are coming from.	3.73	0.52	Very High
3. Collaborate with colleagues and fellow educators to gain additional insights and perspectives in defining the learners' needs accurately.	3.76	0.51	Very High
B. Exploring	**3.72**	**0.52**	**Very High**
B.1 Ideating	**3.73**	**0.52**	**Very High**
1. Generate creative ideas tailored to cater to the specific needs of the learners through improvisation,	3.69	0.53	Very High

contextualization, research-based practices, or innovation.			
2. Think creatively and develop effective and efficient solutions to address the problems, issues, or concerns that the learners face.	3.72	0.52	Very High
3. Encourage open brainstorming sessions with students, allowing them to share their ideas and be part of the ideation process.	3.77	0.51	Very High
B.2 Prototyping	**3.72**	**0.52**	**Very High**
1. Transform creative ideas into feasible materials, outputs, or projects that address the unique needs of the learners.	3.72	0.52	Very High
2. Focus on creating real-life, tangible, and doable solutions that are practical and relevant to the problems, issues, or concerns the learners are encountering.	3.72	0.50	Very High
3. Seek feedback and suggestions from fellow educators and experts to improve and refine the prototypes before implementation.	3.73	0.54	Very High
C. Materializing	**3.66**	**0.53**	**Very High**
C.1 Testing	**3.65**	**0.53**	**Very High**
1. Implement the developed solutions, such as materials, outputs, or projects, to address the learners' needs.	3.63	0.53	Very High
2. Actively seek feedback from the learners to understand their experiences and ideas regarding the effectiveness and efficiency of the solutions being introduced.	3.66	0.54	Very High
3. Collect and analyze data on the impact of the solutions, considering both qualitative and quantitative measures to assess their effectiveness.	3.66	0.51	Very High
C.2 Implementing	**3.66**	**0.54**	**Very High**
1. Roll out proven and tested solutions, including materials, outputs, or projects, to ensure continuous improvement.	3.65	0.55	Very High
2. Evaluate the continuity and sustainability of the proven and tested solutions, aiming for wide dissemination and usage to benefit a larger audience.	3.74	0.51	Very High
3. Collaborate with other educators and experts to integrate successful solutions into the curriculum.	3.60	0.56	Very High
Composite	**3.69**	**0.53**	**Very High**

Table 2 presents the results of the student-teachers' intentions in design-based thinking. The table is organized into three domains: Understanding, Exploring, and

Materializing. As can be discerned from the data, the results indicate that student-teachers have a very high intention to engage in design-based thinking across all domains and items, with a composite mean score of 3.69 and a standard deviation of 0.53. The highest mean score is observed in the Exploring domain (mean=3.72; SD=0.52), followed by the Understanding domain (mean=3.70; SD=0.53), and the Materializing domain (mean=3.66; SD=0.53).

The results suggest that student teachers have a solid intention to engage in design-based thinking and can put this intention into practice. As noted by Lyon and Magana (2021), design-based thinking when used can address the need to design effective learning environments. Indeed, student teachers showed a solid commitment to understanding learners' needs through empathy, defining problems accurately, exploring creative solutions, and materializing these solutions. This suggests a strong inclination among participants to employ design-based thinking in their educational practices.

Significant Difference in Design-Based Thinking Intentions among Student-Teachers When Grouped According to Their Profile

Table 3

Significant Difference in Design-Based Thinking Intentions among Student-Teachers When Grouped According to Their Sex

Group	Mean	Std. Deviation	t-value	p-value	Remarks	Decision
Female	3.68	0.55	-4.50	0.00	Significant	Reject H_0
Male	3.74	0.44				

Table 3 reflects the independent samples t-test results in determining significant differences in design-based thinking intentions among student-teachers when grouped according to sex. As can be discerned from the data, the female group scored a mean of 3.68 with a standard deviation of 0.55, while the male group scored a mean of 3.74 with a standard deviation of 0.44. The t-value obtained was -4.50 with a p-value of 0.00, less than the alpha level of 0.05; therefore, rejecting the null hypothesis, it can be concluded that there is a significant difference in design-based thinking intentions between female and male student-teachers. The results suggest that male student teachers have higher design-based thinking intentions than female teachers.

Table 4

Significant Difference in Design-Based Thinking Intentions among Student-Teachers When Grouped According to Their Area of Specialization

Group	Mean	Std. Deviation	F-value	p-value	Remarks	Decision
English	3.70	0.47	5.97	0.00	Significant	Reject H_0
Filipino	3.63	0.57				
Social Studies	3.75	0.53				

Table 4 reflects the results of the one-way ANOVA conducted to determine if there is a significant difference in design-based thinking intentions among student-teachers when grouped according to their area of specialization. As can be discerned from the data, the English group scored a mean of 3.70 with a standard deviation of 0.47, the Filipino group garnered a mean of 3.63 with a standard deviation of 0.57, and the Social Studies group scored a mean of 3.75 with a standard deviation of 0.53. The F-value obtained was 5.97 with a

p-value of 0.00, less than the alpha level of 0.05; therefore, rejecting the null hypothesis and concluding that there is a significant difference in design-based thinking intentions among the three groups. The results suggest that student-teachers from different areas of specialization have different levels of design-based thinking intentions. The Social Studies group has the highest mean score, while the Filipino group has the lowest mean score.

Table 5

Significant Difference in Design-Based Thinking Intentions among Student-Teachers When Grouped According to the Location of Cooperating Schools

Group	Mean	Std. Deviation	t-value	p-value	Remarks	Decision
Rural	3.66	0.52	-2.36	0.00	Significant	Reject H_0
Urban	3.75	0.53				

Table 5 shows a significant difference in design-based thinking intentions among student-teachers when grouped according to the location of cooperating schools, using the independent samples t-test. As can be discerned from the data, the mean score of student-teachers in rural areas was 3.66 with a standard deviation of 0.52, while the mean score in urban areas was 3.75 with a standard deviation of 0.53. The t-value was -2.36, with a p-value of 0.00, indicating a significant difference between the two groups, therefore rejecting the null hypothesis (H0) that there is no significant difference in design-based thinking intentions between student teachers in rural and urban areas. The student-teachers deployed in urban schools have significantly higher design-based thinking intentions than those stationed in rural schools. These results suggest that the location of cooperating schools may impact student-teacher design-based thinking intentions, with those in urban areas having higher mean scores than those in rural areas.

In general, significant differences are evident in the design-based thinking intentions of student-teachers when grouped according to their profiles, such as sex, area of specialization, and school location. Such differences may exist because there is still a need to determine whether and which dimensions of design thinking mindsets support conceptual learning (Ladachart et al., 2022).

Implications of the Findings to Effective Instructional Delivery

The study suggests that teacher education programs should consider the differences among student-teachers regarding their sex, area of specialization, and location of cooperating schools when providing support and resources to enhance their design-based thinking intentions. To ensure effective instructional delivery, teacher education programs should consider these differences and provide tailored support and resources to address disparities. Tailored support can help address disparities and promote a more inclusive and diverse learning environment. Encouraging collaboration by sharing best practices among student-teachers can also improve their design-based thinking intentions and effective instructional delivery. For instance, programs can organize group projects that allow student-teachers from different areas of specialization and locations to work together and learn from each other. Additionally, teacher education programs can provide additional training and resources to student-teachers who may need more support in developing their design-based thinking intentions, such as female student-teachers, those specializing in certain areas, and those deployed in rural schools. By taking these steps, teacher education

programs can help student-teachers develop their design-based thinking intentions and effective instructional delivery, ultimately improving the learners' education quality.

CONCLUSIONS

The findings indicate that the majority of student-teachers are female, specialized in Filipino, English, and Social Studies, and distributed among rural cooperating schools based on location; the student-teachers have a very high intention in design-based thinking, indicating their strength in empathizing with learners and defining their needs accurately; and there is a significant difference in design-based thinking intentions among student-teachers when grouped according to their profile (i.e., sex, area of specialization, and location of cooperating schools).

The mentioned findings necessitate the University to encourage more gender diversity among students enrolled in the teacher education programs; to offer in- and off-campus training and development opportunities for student-teachers to use design-based thinking in all areas to maintain high proficiency in problem-solving and instructional design, considering their needs and differences; and to sustain a robust practice in incorporating DBT models in various curricula of teacher education programs.

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