The Influence of Assistive Technology and Instructional Design in Student Perceptions of Teacher Competence in Handling Students with Special Needs Among Senior High School

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ABSTRACT

Lack of Information Communication Technology (ICT) skills hinders the competence of teachers in engaging, collaborative, and interactive. This study was to determine the influence between assistive technology and instructional design on teacher competence of teachers handling students with special needs for the school year 2024-2025. This study used a descriptive quantitative research design, utilizing a correlation approach design involving 162 senior high school student respondents. The overall mean score of both assistive technology and instructional design on the teacher's competence of teachers handling students with special needs was interpreted as very high. The study found that there is a significant relationship between assistive technology and instructional design in teacher competencies and the result of the R-value shows a significant influence of both assistive technology and instructional design on teacher competence in handling students with special needs. The result suggests that both have a potential improvement in their teacher's competence and accept the TPACK Framework (Technological, Pedagogical, and Content Knowledge) by Punya Mishra and Matthew J. Koehler. The assertion that teacher perception, materials aspects, and language aspects are accepted and approved by the study's conclusions. It is recommended that this study explore different variables not covered in this study. Such replication is aimed at either reinforcing or questioning the findings of this study, allowing for a broader understanding of the influences on academic progress.

Keywords: assistive technology, instructional design, teacher competence,

INTRODUCTION

Competence is a characteristic of a person behavior in different situations and adapts to changes, it is also an achieving of the desired outcomes (Sulaiman & Ismail, 2020). From other perspectives, outdated learning skills and differentiated instruction in a diverse classroom (Blömeke et al., 2022). However, teachers are not adequately trained in pedagogical content in teaching and understanding students' behavior (Nind 2020). In addition, teachers are required to teach a subject outside their specialization or beyond their subject expert (Darling-Hammond 2023).

In Uganda, based on the study by Kidega et al. (2024), emphasizes poor quality teaching strategies, inadequate teaching materials, high student-to-teacher ratios, and high computer illiteracy rates among teachers. In addition, the study by Āboltiņa et al. (2020), in Latvia, also emphasizes the challenges of adapting to technological advancement and the creation of inclusive classrooms, especially in a diverse cultural community.

Meanwhile, in the Philippines context, the issue of lack of teaching materials and outnumbered activities in schools including the lack of knowledge about research based on DepEd Order (DO) 16, S. 2017, or Research Management Guidelines (RMG) (Abella et al 2024). However, the study of Penuliar and Natividad (2025). emphasizes the mismatch of subject matter and does not have enough training in their subject content knowledge,

The poor quality of teacher competence and teacher-subject mismatch remained underexplored in actual

implementation in an inclusive classroom setting (Amusuglo, 2025). Despite this understanding, there is limited research on targeted interventions to address and improve teacher competence, particularly in digital literacy, classroom management, and emotional intelligence. Thus, this study is conducted.

This study supports Sustainable Development Goal (SDG) 4, particularly Target 4.5, by exploring how technology and instructional design can enhance teachers' ability to support learners with special needs, inform inclusive education policies, and guide future research. Specifically, it aims to determine the significant relationship of assistive technology and instructional design student perceptions of teacher competence in handling students with special needs among senior high school teachers, and also, aims to determine the significant influence of assistive technology and instructional design student perceptions of teacher competence in handling students with special needs among senior high school teachers. Furthermore, it examines the hypothesis that there is no significant influence between the use of assistive technology and instructional design and student perceptions of teacher competence in addressing the needs of students with disabilities.

This study is anchored on the TPACK Framework (Technological, Pedagogical, and Content Knowledge) by Punya Mishra and Matthew J. Koehler in 2006. TPACK is described as a dynamic framework that combines content, pedagogical, and technological knowledge to guide teachers in strategic thinking about when and how to use technology in teaching (Esposito and Moroney, 2020). In this study, assistive technology represents the technological knowledge necessary to support students with special needs, while instructional design reflects the pedagogical strategies that teachers employ to adapt and deliver inclusive instruction effectively. Additionally, content knowledge pertains to the teacher's understanding of special education principles, including diverse learning needs, behavioral management techniques, and individualized educational plans (IEPs).

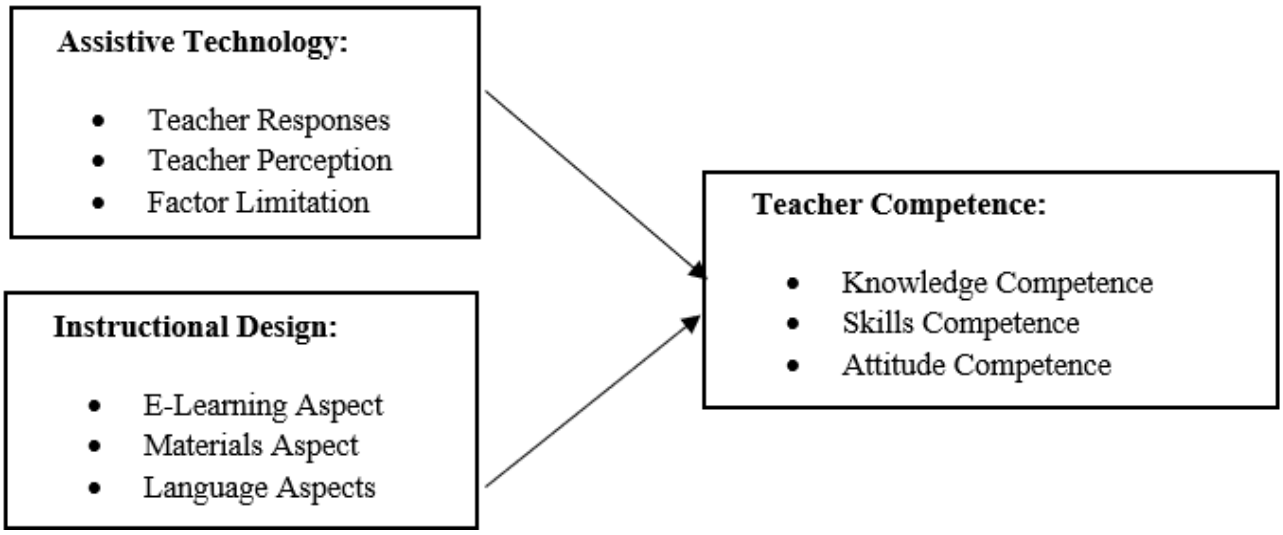

Figure 1: Conceptual Framework of the study

METHOD

A quantitative correlational research design was used in this study. Quantitative research encourages researchers to use multiple approaches to gather, collect, and analyze the data within a single approach (Pluye & Hong, 2014). Upon using this approach, the study can validate the quantitative results, providing a deeper explanation of the contexts in which assistive technology and instructional design affect teacher competence with students with special needs. a descriptive correlational design will be employed. It determines the association and relationship among variables and predicts the important issue based on the current data (Curtis et al., 2016).

This study was conducted at Lavigan National High School, a public secondary school located in Barangay Lavigan, Municipality of Governor Generoso, Province of Davao Oriental, Philippines. The school serves as an academic institution catering to junior and senior high school learners and is supervised by the Department

of Education under the Davao Oriental Division. Surrounded by a rural and agricultural community, the school provides educational opportunities to students coming from various socio-economic backgrounds. Lavigan National High School is committed to inclusive education and is one of the few public secondary schools in the area that implements a Special Education (SPED) program. With its dedicated teaching staff and supportive community, the school continues to be a vital institution in shaping the youth of Barangay Lavigan and nearby areas. The school's conducive learning environment, along with its active engagement in both academic and non-academic activities, makes it an appropriate and relevant setting for this research.

The 162 respondents of the study were senior high school students currently enrolled in public secondary schools for the school year 2024-2025, the quantitative will entail the involvement of the selection of respondents through a total enumeration sampling technique. This technique pertains to the quality of assistive technology and resource availability from the total list of people in a population in obtaining a great amount of knowledge and behavior in senior high school students (Rahman et al., 2022). It was pilot-tested to determine its reliability and its Cronbach's alpha was 0.923 with excellent equivalent internal consistency.

This study strictly followed ethical research protocols to protect the rights, privacy, and well-being of all participants. Informed consent was obtained from all respondent's senior high school students after clearly explaining the objectives, procedures, and voluntary nature of their participation. For respondents under the age of 18, parental consent was also secured before their involvement in the study. Participation was entirely voluntary, and respondents were informed of their right to withdraw at any point without any consequence. To show appreciation for their time and input, a small token of gratitude that included a ball pen and a writing pad was given to participants after completing the data collection process. Anonymity and confidentiality were strictly upheld, and all data collected was used solely for academic and research purposes. Approval from the appropriate school authorities and ethics committee was also obtained to ensure compliance with institutional and ethical guidelines.

The researcher sought and secured official permission to conduct the study by submitting a formal request to the office of the senior high school principal. Upon receiving approval, the researcher distributed the survey questionnaires in both hard copy and online formats using Google Forms. Before distribution, the researcher clearly explained the process of answering the questionnaires to the selected respondents, with the full knowledge and support of the advisers, principal, and school administrator. To ensure clarity and accurate responses, all questions were translated into vernacular during the administration of both formats. The senior high school students participated honestly, providing the necessary information, and all completed questionnaires were successfully retrieved. In compliance with the Data Privacy Act of 2012, the researcher ensured that all data collected remained confidential no personal identifiers were disclosed and strict measures were taken to protect respondent privacy. Printed documents were securely stored in a private compartment, while electronic data were saved on a flash drive, which was also securely kept. After the study concluded, all data both printed and digital were properly disposed of. Digital files were permanently deleted from all devices and printed materials were shredded with documentation maintained to verify the proper disposal process. Once data collection was completed, the researcher compiled and organized the responses for analysis. Statistical analysis was conducted using JAMOVI software, where various methods were applied, including the calculation of the mean to assess assistive technology and instructional design in teacher competence. The standard deviation was used to examine data variability, while the Pearson correlation was employed to identify significant relationships between assistive technology and instructional design. To determine which factors most significantly influenced teacher competence, multiple linear regression analysis was also conducted.

RESULTS

Table 1: Descriptive of The Influence of Assistive Technology and Instructional Design Student Perceptions of Teacher Competence in Handling Students with Special Needs Among Senior High School

Variables	SD	Mean	Description
Assistive Technology	**0.515**	**3.37**	**Very high**

Teachers Responses	0.501	3.48	Very High
Teachers Perceptions	0.501	3.47	Very High
Factor Limitation	0.545	3.16	High
Instructional Design	**0.500**	**3.47**	**Very High**
Language Aspect	0.498	3.56	Very High
E-Learning Media Aspect	0.510	3.44	Very High
Materials Aspect	0.493	3.41	Very High
Teacher Competence	**0.494**	**3.58**	**Very High**
Attitude Competence	0.492	3.60	Very High
Skill Competence	0.494	3.59	Very High
Knowledge Competence	0. 498	3.56	Very High

Presented in Table 1, is the descriptive level the overall results for assistive technology scored a mean score of 3.37 and with a standard deviation of 0.515 and was interpreted as very high. This indicates the teacher's excellent use of assistive technology. Among the three indicators under assistive technology on teacher handling students with special needs, teachers' responses emerged as the highest mean score of 3.48 with a standard deviation of 0.501 and were interpreted as very high. This means that the teachers always demonstrate teacher competence. The lowest mean score of 3.16 with a standard deviation of 0.545 belongs to factor limitation and is interpreted as high. This indicates that the factor limitation is that teachers rarely use assistive technology.

Similarly, the overall results for instructional design scored a mean score of 3.47 with a standard deviation of 0.500 interpreted as very high. This means that the teachers have always used instructional design. Among the three indicators under the instructional design, the language aspect emerged as the highest mean score of 3.56 with a standard deviation of 0.498 and was interpreted as very high. This means that the teachers have always used instructional design. The lowest mean score of 3.41 with a standard deviation of 0.493 belongs to materials aspects, which is interpreted as very high. This means that the teachers have always used instructional design.

Likewise, the results for teacher competence scored a mean score of 3.58 with a standard deviation of 0.494 interpreted as very high. This means that the teachers always demonstrate teacher competence. Among the three indicators under teacher competence on teacher handling students with special needs, attitude competence emerged as the highest mean score of 3.60 with a standard deviation of 0.492 and was interpreted as very high. This means that the teachers always demonstrate teacher competence. The lowest mean score of 3.56 with a standard deviation of 0.498 belongs to knowledge competence, interpreted as very high. This means that the teachers always demonstrate teacher competence. Overall, the findings indicate that teachers maintain a strong and positive outlook on their competence and the tools available to support learners with disabilities.

Table 2: Significance of the Relationship of Assistive Technology, Instructional Design, and Teacher Competence

	Teacher Competence			
	R	**P-value**	**Decision on H0**	**Interpretation**
Assistive Technology	.76	.001	Reject	Significant
Instructional Design	.82	.001	Reject	Significant

Shown in Table 2 is the relationship between assistive technology, instructional design, and teacher competence. The assistive technology shows a strong positive relationship with an R-value of .76 and a p-

value of .001 which means a strong correlation between teacher competence among teachers handling students with special needs that implies that assistive technology has a strong significant relationship with teacher competence signifying the null hypothesis is rejected. Furthermore, the instructional design shown also a strong positive relationship with an R-value of .82 and a p-value of .001 which means a strong correlation between teachers' competencies that implies instructional design has a strong significant relationship signifying that the null hypothesis is rejected.

Table 3: Significance of the Influence of Assistive Technology, Instructional Design, towards Student Perceptions of Teacher Competence

Combined Influence	**Teacher Competence**				
	R2	**F**	**P-value**	**Decision on H0**	**Interpretation**
Assistive Technology &	87.5	36.9	.001	Reject	Significant
Instructional Design					

Table 3 shows that both assistive technology and instructional design have a significant influence on teacher competence. This shows the overall regression model is a strong influence, assistive technology and instructional design as predictors of teacher competence. The results reveal assistive technology and instructional design significantly predict teacher competence as shown in the result of an F-value of 36.9, and a p-value of.001. The p-values are below the 0.05 threshold, leading to the rejection of the null hypotheses, and indicating that both assistive technology and instructional design have a significant influence on teacher competence in handling learners with special needs.

DISCUSSION

The finding indicates that there is a strong and statistically significant relationship between teacher competence and both assistive technology and instructional design. Assistive technology suggests a highly positive association, meaning that as teachers become more skilled in using assistive technologies, their overall competence improves (Baniawwad et al, 2024). Based on the study of Schladant et al (2023), emphasizes that assistive technology enhances teachers' capacity to address diverse learner needs and fosters inclusive learning environments. In instructional design skills are essential for creating meaningful and engaging learning experiences, directly influencing teaching quality and student performance (Kusmawan et al, 2025). These findings affirm the importance of strengthening teacher training programs in these areas to improve overall teacher competence (Dange & Siddaraju 2020).

Assistive technology and instructional design are essential in shaping teacher competence in this technological world (Hoogerwerf et al, 2021). The integration of assistive technologies and instructional design posters in inclusive classroom environments that address the needs of students, especially those with learning disabilities or special needs (Page et al, 2021). The effectiveness of both assistive technology and instructional design provides competence and goal-oriented learning experiences, enabling teachers to collaborate, integrate, and evaluate lessons that promote inclusivity classroom learning (Calhoun, 2023). These components promote curriculum delivery and also enhance a teacher's ability to adapt to technological innovations and varied instructional learning styles (Ajani et al, 2024). Moreover, when supported by positive teacher perceptions and responses, both assistive technology and instructional design become vital tools in improving overall teacher competence and the quality of education (Alghamdi, 2022).

Furthermore, both assistive technology and instructional design are significant predictors of teacher competence, emphasizing their critical roles in effective teaching (Williams et al, 2023). highlights that integrating assistive technologies in the classroom enhances inclusivity and supports diverse learning needs, ultimately improving teaching effectiveness (Yenduri et al, 2023). The instructional design skills enable teachers to plan, structure, and deliver content more effectively, which contributes to better student engagement and learning outcomes (Gameil et al, 2023). A need to reinforce continuous professional development focused on these areas, ensuring that educators are equipped with the necessary tools and strategies to meet the demands of modern education (Gudadur et al, 2023).

Moreover, Assistive technologies and instructional design strategies play an important role in student perceptions of teacher competence in handling learners with special needs (Sulaimani & Bagadood 2023). Tools such as text-to-speech(TTS) software, speech-to-text applications, augmentative and alternative communication (AAC) devices, and interactive whiteboards, Television, Audio, Visual Presentation, help student in communication and learning for students with diverse abilities (Haleeme et al 2022). In instructional design approaches like Universal Design for Learning (UDL), differentiated instruction, and scaffolder learning ensure that learning is accessible and engaging for all students (Rao 2021). Teachers need to employ inclusive and positive learning content in different methods as the students as become more competent, inclusive, and responsive (Akintayo et al, 2024). Integrating these assistive technologies and instructional design not only enhances educational outcomes but also positively influences how students evaluate their teacher competence and effectiveness in inclusive classrooms (Navas-Bonilla et al, 2025).

In addition to the result of very high mean scores in student perceptions suggesting strong outcomes result in confidence in teachers' competence in supporting students with special needs, these results should be interpreted with thoughtful consideration (Lauermann & Hagen 2021) A teacher may effectively use assistive technologies in the classroom, yet still lack customizing the tools for students with special needs (Hamilton 2022). Similarly, instructional strategies like differentiated instruction might be applied in a broad way, but not always with enough to address the needs in terms of cognitive, emotional, or behavioral aspects (Pozas et al 2021). Despite the very high ratings, there are still gaps or areas that require more focus and development. Based on the study of Cumming and Rose (2022), Recognizing and acknowledging these details enables more meaningful intervention and integration, such as targeted training in advanced assistive technologies, and the implementation of Universal Design for Learning rather than simply encouraging the replication of current practices.

Based on the findings that assistive technology and instructional materials are significantly correlated with the teacher competence of teachers handling learners with learning disabilities and that all domains of the predictive variable namely, teacher responses, teacher perceptions, factor limitations, e-learning media aspect, materials aspect, and language aspects significantly influence the criterion variable, it is inferred that for every unit change in the assistive technology and instructional design and its specific domains, there is corresponding effect and influence in the level of teacher competence. Further, based on the conclusion, this study accepts the TPACK Framework (Technological, Pedagogical, and Content Knowledge) by Punya Mishra and Matthew J. Koehler in 2006. The framework contends that technological. Pedagogical, and content knowledge developed through integration, collaboration, engagement, and related learning processes influence teacher competence

Based on the conclusion that for every unit change in the assistive technology and instructional design in its specific domains, there is a corresponding effect and influence on the level of teacher competence, and based on the assertion that assistive technology and instructional design are obtained through integration, collaboration, engagement, interaction and highly professional teacher can improve teacher competence, it is suggested that this study may be replicated with the same variables but conducted in a different locale and among varied study groups. Alternatively, future research could explore different variables not covered in this study. Such replication is aimed at either reinforcing or questioning the findings of this study, allowing for a broader understanding of the influences on teacher competence. According to the report, the R-square value is .875, which means that the predictors, assistive technology, and instructional design can explain 87.5% of the variation involved in teachers handling learners with learning disabilities in teacher competence. The remaining 12.5% percent is attributable to the unexplained variance or other factors not included in this study.

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