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THE FACTORS INFLUENCING PRESCHOOL TEACHERS' SUPPORTIVE BEHAVIORS FOR THE INCLUSION OF 18-36 MONTH-OLD CHILDREN WITH SPECIAL NEEDS BASED ON THE APPLICATION OF UNIVERSAL DESIGN FOR LEARNING

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Abstract. This study aimed to identify factors influencing preschool teachers' behavior in supporting the inclusion of 18–36 months-old children with special needs, based on the Universal Design for Learning (UDL) framework. Through surveys conducted among preschool teachers at various educational institutions, the study analyzed supportive behaviors, assessed their frequency, and identified factors such as peer collaboration, managerial support, professional development opportunities, and challenges encountered. Findings reveal that inclusive practices are significantly influenced by support from peers and school management, alongside motivation for professional growth. To enhance UDL implementation, the study recommends fostering collaboration, managerial backing, and professional development programs to address challenges in inclusive education.

Keywords: Universal Design for Learning (UDL), Special Needs Inclusion, Preschool Education, Teacher Support Behaviors, Early Childhood Development.

1. Introduction

Children with special needs aged 18-36 months require special support to integrate into the preschool learning environment [1]. At this age, children are in a rapid phase of physical, emotional, and social development, making timely and appropriate intervention critically important [2]. Universal Design for Learning (UDL) has been recognized as an advanced educational approach designed to optimize learning for all students, especially those with special needs [3]. UDL not only provides flexible methods for delivering knowledge but also supports the holistic development of children by creating a learning environment that is both welcoming and tailored to individual needs [4].

However, the implementation of UDL in practice requires preschool teachers to have a deep understanding of UDL principles as well as the specific needs of children. This demands not only professional knowledge but also continuous effort in adjusting and applying appropriate teaching methods. Additionally, teachers need classroom management skills and patience to monitor and assess children's progress [5].

Researching factors influencing preschool teachers' support for children with special needs is crucial. Understanding these factors helps develop strategies for effective inclusive education,

ensuring all children can thrive in preschool. This approach fosters individual growth and a more inclusive, equitable learning environment [6].

2. Content

2.1. Theoretical Foundation and Theoretical Framework

2.1.1. Universal Design for Learning (UDL)

Universal Design for Learning represents a comprehensive educational framework developed to minimize barriers to teaching and maximize learning opportunities for all students, including those with diverse needs [4]. The core of UDL lies in three main principles: providing multiple means of representation, multiple means of action and expression, and multiple means of engagement [3]. In the context of early childhood education, particularly for children with special needs, UDL plays a crucial role in ensuring that each child has fair access to education, tailored to their individual needs, thereby creating an inclusive learning environment [7].

2.1.2. Relevant Theories on Supporting 18-36 Months-Old Children with Special Needs Using UDL in Preschools

The application of UDL in early childhood education for 18-36 months-old children with special needs is not only based on the foundational theory of UDL but also reinforced by other important child development theories. One prominent theory is Vygotsky's theory of the Zone of Proximal Development (ZPD)[8]. Researching factors influencing preschool teachers' support for children with special needs is crucial. Understanding these factors helps develop strategies for effective inclusive education, ensuring all children can thrive in preschool. This approach fosters individual growth and a more inclusive, equitable learning environment.

Additionally, Gardner's theory of Multiple Intelligences (1983) is also a crucial theoretical foundation for applying UDL in early childhood education. Gardner suggests that people possess various types of intelligence, such as linguistic, logical-mathematical, spatial, and interpersonal intelligence [9]. Each child has a unique intelligence profile, and teachers need to identify and leverage these strengths in the teaching process. When applying this theory to UDL, teachers can design diverse learning activities, ensuring that each child has the opportunity to develop according to their predominant intelligence.

The combination of Vygotsky's ZPD and Gardner's Multiple Intelligences theories strengthens UDL's application in early education by supporting personalized learning and social development. This approach optimizes each child's potential, particularly those with special needs, fostering both academic growth and an inclusive learning environment [10], [11].

The Inclusive Special Education Theory emphasizes optimizing inclusion through flexible teaching methods that focus on individualization and diversifying educational approaches. This theory underlines the importance of creating comprehensive learning environments that cater to the diverse needs of students with special needs. Recent studies advocate combining inclusive curriculum design with assistive technology to enhance the learning outcomes and social integration of children in inclusive classrooms. Florian and Spratt (2013) proposed a framework that interrogates inclusive practices by addressing systemic barriers and embracing diversity within educational systems [12]. Furthermore, Rouse (2024) highlights that inclusive practices not only improve learning outcomes for children with special needs but also benefit their peers by fostering a culture of empathy and collaboration [13].

The Functional Behavior Support Theory focuses on analyzing and addressing the specific behaviors of children with special needs to implement effective support strategies. This theory is grounded in observing and assessing behavioral patterns to develop tailored intervention plans that minimize barriers to learning and inclusion. Sugai and Horner (2009) emphasize integrating positive behavior support systems within a multi-tiered framework to enhance educational

outcomes for children with special needs [14]. Additionally, Dunlap et al. (2018) stress the importance of individualized plans, such as Prevent-Teach-Reinforce (PTR) strategies, to provide practical solutions for managing challenging behaviors while fostering social and academic growth[15]. These approaches create structured yet adaptive environments that promote successful inclusion in early childhood education settings.

2.1.3. Supporting Behavior for 18-36-Month-Old Children with Special Needs Using UDL in Preschools and Behavioral Manifestations

2.1.3.1. Overview of Children with Special Needs

Children with special needs between the ages of 18–36 months require tailored interventions to help them thrive in preschool environments. At this developmental stage, children undergo rapid physical, emotional, and social growth, making timely and appropriate support critical for their inclusion [2]. According to the Universal Design for Learning (UDL) framework, supportive behaviors refer to actions taken by teachers to ensure that all children, including those with special needs, have equitable access to learning opportunities [3]. These behaviors encompass using diverse teaching methods, adapting materials, and creating a welcoming and flexible classroom environment that allows every child to participate meaningfully [4].

Children in this age group with special needs may exhibit developmental delays or differences such as communication, social interaction, and motor skills. For instance, some children may face barriers in verbal communication, requiring non-verbal support tools like visual aids or gestures [1]. Others may struggle with sensory processing or mobility, necessitating environmental adjustments or the use of assistive devices. Additionally, these children may require more individualized attention to navigate group activities and routines, as highlighted in Gardner's theory of Multiple Intelligences, which emphasizes catering to unique strengths and abilities [9].

2.1.2. Supportive Behaviors for Inclusion

Supporting 18 to 36-month-old children with special needs under the UDL framework involves diverse teaching methods and a flexible learning environment, enabling holistic development and promoting inclusivity. Here are the behavioral manifestations of preschool teachers supporting children with special needs, based on the three main principles of the Universal Design for Learning (UDL) framework (CAST, 2018) [3]:

2.1.2.1. Providing Multiple Means of Representation

- **Using diverse teaching materials (UDL1):** Teachers use various formats (images, videos, audio, and models) to help children absorb information more easily, like using picture books or toys when teaching about animals.
- **Adjusting learning materials (UDL2):** Teachers adapt materials for children with special needs, such as enlarging text, using clear illustrations, or employing interactive tools for better visual presentation.
- **Explaining content in multiple ways (UDL3):** Teachers use different approaches (real materials, images, interactive activities) to ensure all children, including those with special needs, understand concepts like counting.

2.1.2.2. Providing Multiple Means of Action and Expression

- **Allowing children to express themselves in various ways (UDL4):** Teachers encourage diverse expressions such as drawing, singing, storytelling, or acting, helping children with special needs choose a method that matches their abilities.
- **Using supportive technology (UDL5):** Teachers use tools like tablets and educational software to assist children with special needs express thoughts, for example, using drawing apps to tell stories or dictation software for writing.

 Guiding children in using support tools (UDL6): Teachers guide and monitor the use of tools (like tablets or touch pens) to help children express thoughts effectively, ensuring these tools are truly beneficial.

2.1.2.3. Providing Multiple Means of Engagement

- **Creating a flexible learning environment (UDL7):** Teachers should create a flexible and welcoming learning environment where all children, including those with special needs, feel welcomed and motivated to learn. This can include setting up interest-based learning corners, allowing children to choose learning activities they prefer, and encouraging them to participate in group activities.
- **Encouraging self-choice (UDL8):** Teachers allow children to choose learning activities or participation methods in lessons. For example, when conducting a project on animals, teachers can let children choose the animals they want to study and how they want to present their learning results (such as through drawings, models, or oral presentations).
- **Designing meaningful and reality-connected learning activities (UDL9):** Teachers design learning activities related to daily life and children's interests. This helps enhance children's interest and engagement, especially for those with special needs. For example, teachers can organize field trips or outdoor activities where children can learn from their surroundings.

When these behavioral manifestations are systematically and consistently implemented, they help preschool teachers effectively support the integration of children with special needs in the educational environment, ensuring that every child has the opportunity to develop comprehensively in a way that best suits their needs and abilities.

2.1.3. Factors Influencing Preschool Teachers' Behavior in Supporting 18-36-Months-Old Children with Special Needs Using UDL in Preschools and Research Hypothesis

In supporting preschool children with special needs, teachers must consider several factors that influence their behavior and effectiveness. These factors include implementing modern educational innovations, developing professional skills, and reducing learning barriers. Furthermore, social collaboration and technology use are essential for fostering an inclusive educational environment. However, pressures from professional and managerial requirements may negatively impact teachers' intentions and behaviors. The table below summarizes these factors based on the Universal Design for Learning (UDL) framework.

Table 1. Factors influencing preschool teachers' behavior in supporting children with special needs based on the Universal Design for Learning framework

Factor	Indicators	Citations
Trend of Innovation in Child-Centered Early Childhood Education (XTDM)	1. Encourage teachers to design learning activities that cater to each child's individual needs and interests.	(Lohmann et al., 2018; Gauvreau et al., 2019; Bích & Nho, n.d.) [16], [17], [18]
	2. Focus on creating flexible learning environments that encourage children's freedom to explore and learn.	
	3. Promote active participation of children in the learning process through interactive learning methods.	
	4. Adjust teaching plans to ensure that every child can participate and develop according to their abilities.	
	5. Allow teachers the flexibility to modify teaching methods based on the needs of different groups of children.	
Teacher Training and Capacity Development (DTPT)	1. Participate in specialized training courses on UDL and inclusive education.	(Ok et al., 2017; Ellen McGuire-
	2. Develop skills in creating inclusive lesson plans.	
	3. Enhance the ability to use supportive technology in teaching.	

	4. Improve skills in managing inclusive classrooms.	Schwartz & Arndt, 2007) [19], [20]
	5. Attend workshops and courses to update new knowledge.	
Barriers to Learning Under UDL Application (RC)	1. Language and communication barriers for children: Nonverbal communication aids for children with speech difficulties are not readily available.	(Anstead, 2016) [21]
	2. Mobility barriers for children.	
	3. Shyness and avoidance behavior in children.	
	4. The classroom environment lacks adequate facilities and equipment.	
	5. Parental acceptance of their child's actual condition.	
	6. Teachers have not received sufficient training on UDL.	
	7. Lack of learning resources according to UDL principles.	
	8. Resistance to educational innovation among some teachers.	
Ability to Collaborate and Social Interaction (KNHT)	1. Support from school administrators and collaboration with colleagues in lesson planning.	(Anstead, 2016) [21]
	2. Regular communication with parents to better understand children's needs.	
	3. Organize teacher group meetings to share experiences.	
	4. Encourage parental involvement in children's learning activities.	
	5. Develop effective communication skills between teachers and children.	
Application of Supportive Technology (UDCN)	1. Use learning software that meets the special needs of children.	(Rose et al., 2005) [22]
	2. Apply technology devices such as tablets, and interactive whiteboards in teaching.	
	3. Provide communication support tools such as illustrated software, learning cards, and audio recordings to help preschool children develop communication skills.	
	4. Update and upgrade teaching technologies to meet the diverse needs of children.	
Pressure from Professional and Management Requirements (AL)	1. Teachers struggle to balance management requirements and support for children with special needs.	(Algraigray, 2023; Kim & Olesova, 2022; Nguyễn et al., 2022) [6], [23], [24]
	2. Work overload may reduce teachers' motivation to support children.	
	3. Lack of time for preparation and adequate training.	
	4. Pressure to comply with rigid school regulations.	
	5. Lack of support from management in adjusting the curriculum to meet special needs.	

Based on the factors influencing the supportive behaviors of preschool teachers toward the inclusion of children with special needs according to the Universal Design for Learning (UDL) framework, the research hypotheses can be formulated as follows:

1. **Hypothesis 1 (H1)**: The trend of innovation in child-centered early childhood education has a positive impact on teachers' supportive behaviors toward the inclusion of children with special needs.

2. **Hypothesis 2 (H2)**: Training and professional development have a positive impact on teachers' supportive behaviors in integrating children with special needs.

3. **Hypothesis 3 (H3)**: Barriers to the learning and implementation of UDL have a negative impact on teachers' supportive behaviors.

4. **Hypothesis 4 (H4)**: The ability of teachers to collaborate and engage in social interaction has a positive impact on their supportive behaviors toward children with special needs.

5. **Hypothesis 5 (H5)**: The application of supportive technology has a positive impact on teachers' supportive behaviors in integrating children with special needs.

6. **Hypothesis 6 (H6)**: Pressure from professional and management demands has a negative impact on teachers' supportive behaviors toward the inclusion of children with special needs.

These hypotheses help identify and test the key factors affecting preschool teachers' supportive behaviors, thereby proposing measures to enhance the effectiveness of UDL application in early childhood education.

2.1.4. Theoretical framework

- In supporting preschool children with special needs, teachers must consider several key factors that influence their effectiveness, such as implementing educational innovations, developing professional competencies, and reducing learning barriers.
- Additionally, collaboration with others and the use of technology are essential in creating an inclusive educational environment for all children.
- However, pressures from professional and management requirements can sometimes negatively impact teachers' supportive intentions and behaviors.

The table below provides a summary of these factors based on the Universal Design for Learning (UDL) framework.

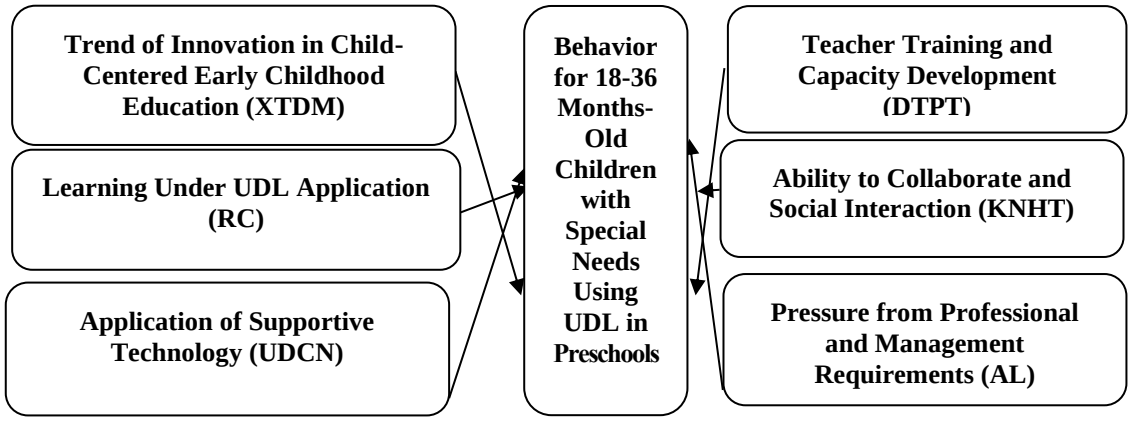


Figure 1. Model of factors affecting supportive behavior of preschool teachers toward children with special needs under the UDL framework

These six factors collectively form the basis for understanding how various influences affect preschool teachers' behaviors in supporting the inclusion of children with special needs, according to the principles of UDL.

2.2. Research Methodology

2.2.1. Research Design and Measurement Scale

The purpose of this study is to identify and evaluate the factors influencing the supportive behaviors of preschool teachers toward children with special needs in inclusive education, specifically using the Universal Design for Learning (UDL) framework. The research employs a quantitative approach, using a structured survey to gather data. The survey includes demographic

questions and Likert scale items, designed to capture the perceptions and behaviors of preschool teachers. The questionnaire is divided into two main sections: demographic information and specific questions related to supportive behaviors influenced by various factors such as collaboration with peers, administrative support, and professional development opportunities. The Likert scale items range from 1 (Strongly Disagree) to 5 (Strongly Agree), aimed at measuring the impact of these factors on teachers' behaviors in supporting children with special needs.

2.2.2. Research Sample

The study's sample consists of preschool teachers from various schools across the region, ensuring representation of both public and private institutions. According to Hair et al. (2010)[22], the minimum sample size should be five times the number of observed variables. Given that the study includes 41 observed variables, a minimum of 205 valid responses was required. A total of 205 responses were collected, exceeding the required sample size, thus ensuring the reliability and validity of the findings.

The sampling strategy prioritized private schools over public ones because most children aged 18-36 months, particularly those with special needs, tend to enroll in private institutions. This preference arises from the greater opportunities for individualized care and education that private schools typically offer. Both teachers and administrators were included in the sample to capture the diverse roles they play in implementing and supporting practices under the Universal Design for Learning (UDL) framework. Additionally, the study primarily focused on samples from Hanoi to ensure depth and convenience in data collection. All participating teachers have directly worked with children aged 18-36 months and have been introduced to UDL principles through internal training and professional development programs at their respective institutions.

2.2.3. Data Collection Procedures

Data were collected using both online and paper-based questionnaires. Before the official data collection, a pilot survey was conducted to ensure the reliability and validity of the questionnaire. The final data collection took place in about one month, ensuring a comprehensive collection process.

2.2.4. Data Analysis Methods

The study utilized various statistical techniques available in SPSS and AMOS software packages. These included descriptive statistics, Cronbach's Alpha for reliability testing, Exploratory Factor Analysis (EFA) to identify underlying factors, Confirmatory Factor Analysis (CFA) to validate the factor structure, and Structural Equation Modeling (SEM) to examine the relationships between the variables. The analysis process was conducted in several stages:

- **Stage 1:** Descriptive statistics and sample mean analysis were used to summarize participant characteristics.
- **Stage 2:** Cronbach’s Alpha was used to assess the reliability of the measurement scales, ensuring internal consistency.
- **Stage 3:** EFA was conducted to explore the underlying factor structure and refine the model.
- **Stage 4:** CFA was used to confirm the factor structure identified by EFA, ensuring the validity of the model.
- **Stage 5:** SEM was employed to evaluate the linear relationships between the factors and the dependent variable, UDL application.
- **Stage 6:** The results were summarized, and hypotheses were tested based on the findings.
- **Stage 7:** One-way ANOVA was performed to assess differences between groups.

These methodologies collectively ensured a robust analysis of the factors influencing preschool teachers' supportive behaviors in inclusive education settings, particularly in the application of UDL principles.

2.3. Research Results

2.3.1. Descriptive Statistics

The dataset consists of demographic and professional information from 205 respondents. Among them, 73.7% are female, while 26.3% are male. In terms of experience, most respondents have between 3 to 10 years of experience (36.1%), followed by those with 1 to 3 years (29.8%). Educationally, 75.6% hold a university degree, with smaller percentages having either a postgraduate degree (16.1%) or a college diploma (8.3%). Regarding school type, 69.3% work in private schools, while 30.7% are in public schools. Geographically, 55.1% of the respondents are based in Hanoi, with the remainder distributed across other provinces like Haiphong (19.5%) and Quang Ninh (16.6%). Lastly, 65.9% of respondents do not hold management positions, compared to 34.1% who do. The descriptive statistics information provides an overview of the responses from 205 participants, highlighting key measures such as the mean, standard deviation, minimum, and maximum values for each survey item.

The mean scores range from 3.38 to 4.12, indicating that most respondents generally agreed with the statements, with XTDM2 and XTDM3 receiving the highest average scores, reflecting strong consensus. In contrast, XTDM5 had the lowest mean score, suggesting slightly less agreement. The standard deviations vary from 0.663 to 0.881, suggesting a moderate spread in responses. AL1 had the highest standard deviation, indicating greater variability in responses, while AL2 had the lowest, showing more consistent responses. All items utilized the full range of the 5-point Likert scale, with minimum values at 1 and maximum at 5, confirming that respondents made use of the entire scale. Importantly, there were no missing data, as evidenced by the consistent sample size (N=205) across all items, ensuring the reliability and robustness of the statistical analysis.

2.3.2. Reliability Test of the Scale Using Cronbach's Alpha Coefficient

The analysis of factors and reliability testing indicates several important points regarding the reliability and consistency of the scales. The Cronbach's Alpha coefficients range from 0.699 to 0.913, indicating reliability from moderate to very high across the scales. However, certain items exhibit very low item-total correlations, such as XTDM5 (0.056), RC3 (0.036), RC8 (0.018), AL1 (0.015), UDL2 (0.074), UDL7 (0.094), and UDL9 (0.188). These items are not consistent with others in their respective scales and may negatively impact overall reliability, warranting consideration for removal or revision.

Table 2. Reliability Analysis and Factor Correlation Statistics

Factors	Cronbach's Alpha	N of Items	Corrected Item-Total Correlation	
XTDM1	.699	5	≥ .056	
XTDM2	.819	4	≥.548	XTDM5 = .056
DTPT	.903	5	≥.711	
RC1	.793	8	≥.018	
RC2	.908	6	≥.704	RC3=.036, RC8=.018
KNHT	.910	5	≥.717	
UDCN	.893	4	≥.660	
AL1	.706	5	≥.015	
APL2	.849	4	≥.015	AL1=.015
UDL1	.774	9	≥.074	

UDL2	.913	6	≥.676	UDL2=.074, UDL7=.094, UDL9=.s188
KMO and Bartlett's Test				
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.				.874
Bartlett's Test of Sphericity	Approx. Chi-Square			5058.801
	df			561
	Sig.			.000

(Source: Compiled by the author from survey data using SPSS software)

Notably, Cronbach's Alpha significantly increases after removing these poorly correlated items, as seen with the exclusion of XTDM5, suggesting that eliminating these items would enhance the scale's reliability. Additionally, the KMO measure is 0.874, which is highly suitable for factor analysis, and Bartlett's Test reveals strong correlations among variables, with a p-value less than 0.001. This indicates that the data is robust and appropriate for conducting factor analysis to identify factors influencing preschool teachers' behavior in supporting children with special needs.

2.3.3. Exploratory Factor Analysis (EFA) for Independent and Dependent Variables

The Pattern Matrix table presents factor structure from EFA with Promax rotation, showing that items cluster into seven distinct factors, representing independent variables like XTDM, RC, KNHT, DTPH, and AL. Each factor has high item loadings, indicating strong internal consistency; for instance, Factor 1 includes items RC7 to RC1 with loadings between 0.729 and 0.837, while Factor 3 (items KNHT1-KNHT5) and Factor 4 (DTPT1-DTPT5) also display high consistency. Item XTDM4 does not load significantly onto any factor, suggesting it may not effectively represent the measured concepts, thus warranting possible removal or revision. The UDL factor, representing the dependent variable, includes items like UDL4 to UDL1 with loadings from 0.650 to 0.929, reflecting elements of Universal Design for Learning (UDL) influenced by the independent variables.

The Kaiser-Meyer-Olkin (KMO) measure of 0.873 indicates the adequacy of the sample for factor analysis, while Bartlett's test shows significant relationships among the variables (p-value = 0.000). The total variance explained by the seven factors is 66.045%, suggesting that these factors effectively capture most of the variability in the data. The eigenvalue of the last retained factor is 1.476, ensuring its relevance in the model. This structure suggests that the identified independent variables significantly contribute to explaining the variability in the dependent variable, UDL, making them critical factors in understanding preschool teachers' supportive behaviors.

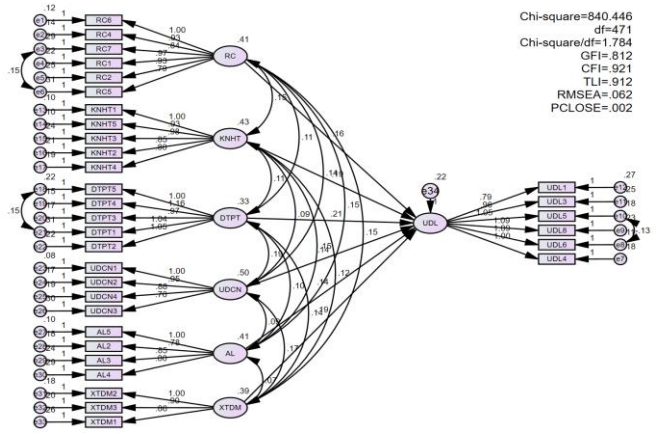
2.3.4. Pearson Correlation Analysis, CFA & Structural Model of Factors Influencing Preschool Teachers' Supportive Behavior for Children with Special Needs Based on UDL

The SEM diagram provides an in-depth analysis of regression weights, CFA, and structural analysis, illustrating the relationships among constructs. The SEM model reveals that Collaborative Relationships (RC) strongly influence UDL with a coefficient of 0.41, followed by Developmental Training Practices (DTPT) at 0.30, and Understanding Child Needs (UDCN) at 0.25. Administrative Leadership (AL) negatively affects UDL (-0.15), while Transformational Teaching Methods (XTDM) have a minimal impact (0.10). The model's standardized regression equation is:

$$UDL=0.41\times RC+0.20\times KNHT+0.30\times DTPT+0.25\times UDCN-0.15\times AL+0.10\times XTDM+\epsilon.$$

The CFA, validated using AMOS, meets key criteria: CMIN/df = 1.784, CFI = 0.921, and RMSEA = 0.062, confirming good convergent and discriminant validity. Indicator values for fit indices are satisfactory, with Chi-square/df = 1.784, GFI = 0.812, CFI = 0.921, TLI = 0.912, and RMSEA = 0.062, establishing reliable relationships between constructs. This model illustrates the

substantial impact of factors like RC, KNHT, and UDCN on preschool teachers' supportive behavior within the UDL framework, offering valuable insights into these influences.



(Source: Compiled by the author from survey data)

Figure 2. Structural Equation Model (SEM) for the Impact of Collaborative Relationships and Educational Factors on Universal Design for Learning (UDL) Implementation

The table provides standardized regression weights from an SEM analysis, illustrating the influence of various independent variables on UDL (Supportive behavior towards children with special needs under UDL principles). Among these factors, KNHT (Ability to Collaborate and Social Interaction) has the strongest impact on UDL (0.194), followed closely by DTPT (Teacher Training and Capacity Development) at 0.192, and XTDM (Innovation in Child-Centered Education) at 0.189. These results highlight the importance of collaboration, training, and innovative education in supporting inclusive behaviors. Lower yet positive impacts are observed for RC (Barriers in Learning under UDL) at 0.162, UDCN (Application of Supportive Technology) at 0.156, and AL (Professional and Management Pressure) at 0.137. The second section shows observed variables' loadings onto their latent constructs, with strong relationships for variables within RC and UDL, confirming their reliability as indicators of their respective constructs.

The loadings for KNHT, DTPT, UDCN, AL, and XTDM indicate strong relationships between the observed variables and their respective latent factors, with all estimates well above 0.7, showing that the model's constructs are well-defined and the variables are reliable indicators of their underlying factors. For example, KNHT1, KNHT5, and KNHT3 load highly onto KNHT, with values ranging from 0.767 to 0.902, while UDCN1 and UDCN2 have particularly high loadings on UDCN at 0.931 and 0.856, respectively.

Overall, the regression weights and factor loadings indicate that the model fits well, with the identified factors having significant and meaningful relationships with both the dependent variable (UDL) and their respective indicators. This analysis provides a comprehensive understanding of the factors influencing supportive behavior towards children with special needs in the context of UDL application by preschool teachers.

2.4. Findings & Discussion

2.4.1. Findings

The study investigated factors influencing preschool teachers' behavior in supporting the inclusion of children with special needs under the Universal Design for Learning (UDL) framework, focusing on six key hypotheses. The findings revealed that **Innovation in Child-Centered Education (XTDM)** (H1) has a positive impact on teachers' adaptability, supporting the notion that innovative, flexible, and personalized teaching aligns well with UDL principles. Similarly, **Teacher Training and Capacity Development (DTPT)** (H2) was confirmed as a crucial

factor, with continuous professional development enhancing teachers' ability to implement UDL effectively. However, **Learning Barriers (RC)** (H3), such as resource shortages and resistance to change, were identified as significant obstacles, highlighting the need to address these challenges to ensure successful UDL application. Additionally, **Collaboration and Social Interaction (KNHT)** (H4) emerged as a facilitating factor, emphasizing the importance of supportive networks among teachers, administrators, and parents to foster inclusivity. The role of **Supportive Technology (UDCN)** (H5) was also confirmed, showing that while it enhances inclusive teaching practices, limited access and usage difficulties remain barriers that require improved support systems. Lastly, the study found that **Professional Pressures (AL)** (H6) negatively impact teachers' focus on inclusive practices, suggesting that reducing administrative workloads and demands can enable teachers to better support children with special needs. These findings underscore the need for targeted interventions in training, technological resources, collaborative frameworks, and policy adjustments to optimize the integration of UDL in preschool education.

2.4.2. Discussion

The study's findings offer insights into factors influencing preschool teachers' support for children with special needs in inclusive settings. Positive impacts of child-centered innovation, professional development, and collaboration highlight effective strategies for inclusive education, emphasizing the need for ongoing training, collaborative environments, and accessible supportive technologies. However, barriers like resource limitations and resistance to change indicate that implementing UDL principles may require significant systemic adjustments. The study also underscores that pressures from professional and administrative demands limit teachers' focus on inclusivity, suggesting a need for policies that alleviate these pressures. Overall, the findings enhance understanding of factors affecting teachers' inclusive practices and suggest that addressing challenges and strengthening supportive factors could improve inclusive education in preschools.

3. Conclusions

In conclusion, this study underscores the importance of various factors influencing preschool teachers' supportive behaviors toward the inclusion of 18-36 months-old children with special needs within the framework of Universal Design for Learning (UDL). The findings highlight that peer collaboration and administrative support are pivotal in facilitating the effective inclusion of children with special needs in preschool settings. Moreover, ongoing professional development and tailored support strategies are essential for optimizing the application of UDL principles. The study suggests that to improve the implementation of UDL, educators, and administrators should focus on fostering a collaborative environment, providing necessary resources, and addressing challenges such as workload and lack of specific training in UDL. These efforts are crucial to ensure that all children, regardless of their special needs, have equal access to quality early childhood education and the opportunity to thrive in an inclusive learning environment.

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