




An investigation of K–12 teachers' perception and use of differentiated instruction based on qualification, training, and experience

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ABSTRACT

Article History

Received: 27 June 2023

Revised: 13 November 2023

Accepted: 4 March 2024

Published: 25 March 2024

Keywords

Differentiated instruction
Experience
Implementation
Perceptions
Qualification
Training.

The purposes of the current study are to examine the levels of teachers' perception and implementation of differentiated instruction (DI) and investigate the difference between teachers' perception and the implementation of DI based on their qualifications, training in teaching students with special educational needs (SEN) and teaching experience. By employing a cross-sectional design, this study administered a survey to select 262 K–12 teachers working in Maldivian schools. Descriptive statistics including cross-tabulation were used in this study as the method of data analysis. Findings revealed that, for both perception and implementation of DI, the majority of teachers (52.8% and 52.3%, respectively) scored higher than the average. With respect to teachers' perception, the results indicate that the majority of those who have a master's level qualification (47.1%) had a low level of perception, while the vast majority of those who had specialized SEN training (75.0%) had a higher level of perception. With regard to implementation, unlike teachers with a bachelor's degree or diploma level qualifications, the majority of those who have a master's level qualification had a higher level of implementation (57.1%). Moreover, teachers who had specialized in SEN training had a higher level of implementation (66.7%), while the majority of the most experienced teachers had a lower level of implementation (51.3%). These findings confirm the importance of teachers' continuous professional development, especially those who teach in high key-stage classes.

Contribution/Originality: There are deficiencies and inconsistencies in existing research with respect to factors that influence teachers' perception and implementation of DI. This study adds to existing knowledge by examining the level of teachers' perception and implementation of DI and investigating the difference in these with regard to a number of demographic factors.

1. INTRODUCTION

Instruction today has transformed from traditional teaching toward an innovative approach that acknowledges student diversity (Manzoor & Nawaz, 2022). It is evident from literature that capitalizing learners' differences of cultures, socioeconomic classes, and family backgrounds is a novel trend ensued in current pedagogy (Alavinia & Viyani, 2018; Halim, Sunarti, & Ibrahim, 2022; Schindler & Reimer, 2011). However, despite the significant transformations, stakeholders often raise concerns on how innovative methods are adopted in contemporary classrooms. In order to ensure that every student has access to high-quality schooling, teachers are required to be

competent in using effective instructional strategies – one such instructional approach is differentiated instruction (Halim et al., 2022; Stewart, 2016; Tomlinson et al., 2003; Tomlinson, 1999).

Differentiated instruction (DI) is based on the philosophy that teachers should adapt the learning environment and processes according to students' unique needs, interests, and learning profiles (Kanevsky, 2011; Tomlinson, 2003). As an instructional strategy, DI provides multiple means to understand, make sense of, and absorb information (Tomlinson & Imbeau, 2013). The main focus of DI is on who, where, and how to teach (Tomlinson & McTighe, 2006) based on students' needs in multi-ability classrooms.

Several scholars have reported that DI is effective in promoting greater content understanding and academic gains of students (Aranda & Zamora, 2016; Graham, 2009; Makrina, 2022). This has been confirmed in a variety of disciplines, such as mathematics education (Muthomi & Mbugua, 2014), English as a Foreign Language (EFL) (AlHashmi & Elyas, 2018), reading comprehension (Aliakbari & Haghghi, 2014), the cognitive skills of slow learners (Kaur & Gupta, 2019), and different education courses (Green & Towson, 2022; Santangelo & Tomlinson, 2009). DI is not only beneficial for academic achievement, it also includes other related areas such as student engagement and interest in a classroom setting (Dosch & Zidon, 2014; Halim et al., 2022), students' attitudes (Senturk & Sari, 2018), and motivation, appropriateness of access and autonomy (AlHashmi & Elyas, 2018).

Despite the availability of research that considers DI as a potentially successful instructional option, there are still substantive deficiencies and inconsistent findings on the topic, especially in relation to variables such as teachers' experience and qualification (e.g., Merawi, 2020; Siam & Al-Natour, 2016; Suprayogi, Valcke, & Godwin, 2017). Therefore, more empirical evidence is needed to strengthen the conclusions on these factors. Hence, the aims of the current study are twofold: (i) to examine the level of teachers' perceptions and implementation of DI, and (ii) to investigate the difference in teachers' perceptions and implementation of DI with regard to their qualification, SEN training, and teaching experience. Accordingly, the current study is guided by the following four research questions:

1. What is the level of teachers' perception of DI?
2. To what extent do teachers implement DI in their teaching?
3. What is the difference in the level of teachers' perception of DI based on their qualification, SEN training, and teaching experience?
4. What is the difference in the extent of teachers' implementation of DI based on qualification, SEN training, and teaching experience?

2. LITERATURE REVIEW

There is a slight disparity in how the term 'differentiated instruction' is demarcated by different authors (Maddox, 2015). Several terminologies, such as individualized instruction, adaptive instruction, personalized learning, differentiated assessment, inclusion, student-centered instruction, response to intervention, and Universal Design of Learning (UDL), are used to characterize differentiated instruction (Alavinia & Viyani, 2018; Suprayogi et al., 2017). In this study, we define 'differentiated instruction' as a pedagogical approach that provides all students with opportunities for learning while embracing their individual differences and needs.

The differentiated instruction model proposed by Tomlinson (2001) is the main theoretical basis for the current research as the model is all-inclusive, established, and is frequently cited in academic work (Hall, Strangman, & Meyer, 2003; Santangelo & Tomlinson, 2012). The DI model explains that teachers respond to students' needs through the four elements of content, process, product, and environment that are aligned to students' readiness, interests, or learning profiles (Santangelo & Tomlinson, 2009; C. A. Tomlinson, 2001).

Previous scholarly studies on DI have focused on a variety of outcomes, including academic achievement, problem-solving, higher-order thinking, reflective thinking, motivation, attitude to lessons, and scientific process skills (Smale-Jacobse, Meijer, Helms-Lorenz, & Maulana, 2019). Many of these studies investigated the effectiveness of various DI approaches. The effectiveness of DI may vary depending on the specific type of instruction, the students'

individual needs, and the teacher's skills and knowledge. For instance, a large-scale meta-analysis by Scheerens (2016) found that adaptive teaching, a type of DI, had a very small effect on student achievement. On the other hand, Tieso (2003) found that ability grouping, another type of DI, can have a positive impact on student achievement if grouping is flexible and teachers adapt their instruction to the needs of different groups. A meta-synthesis by Steenbergen-Hu, Makel, and Olszewski-Kubilius (2016) on the effects of ability grouping in K–12 education found that within-class grouping had at least a small positive impact on students' academic achievement.

Most of these studies were conducted on primary education and undergraduate students, while questionnaires, interest scales, attitude scales, personal ability scales, achievement tests, and interviews were used as data collection tools (Kahyaoglu, 2016; Smale-Jacobse et al., 2019). Additionally, several of the studies on DI are masters or doctoral theses which are typically quasi-experimental, mixed, or quantitative studies.

2.1. Teachers' Perceptions of Differentiated Instruction

In several of the studies, teachers' perceptions about DI were found to be highly positive, confirming the belief that DI is essential for student success (Burkett, 2013; Chien, 2015; Dack, 2019). There were also studies that revealed a correlation between teachers' perceptions and their implementation of DI (Charles & Luard, 2018; Richards-Usher, 2013). Nevertheless, although teachers think positively about DI, there are studies that present teachers' tenets about DI with its challenging nature, highlighting potential barriers that impede their use of differentiation strategies (Merawi, 2018; Nedellec, 2015; Robinson, Maldonado, & Whaley, 2014). Despite these barriers, teachers consider that possibilities for implementation of differentiation strategies outweigh the barriers they encounter in teaching (Tobin & Tippett, 2014).

2.2. Implementation of Differentiated Instruction

As reported by some of the studies, the implementation of DI makes students interact with curriculum content and they feel well supported with long-lasting and meaningful learning (Altun & Nayman, 2022; Mastropieri et al., 2006). Some researchers reported accomplishments related to DI, including increased motivation that enhanced interactions between students and teachers, ultimately reducing student achievement gaps (Ginja & Chen, 2020).

Despite the reported benefits of DI (see learning (Altun & Nayman, 2022; Ginja & Chen, 2020; Mastropieri et al., 2006)), some studies found that teachers' implementation of DI is at a very low level (Onyishi & Sefotho, 2020), ascribing to several reasons, such as a lack of DI knowledge, large class sizes, limited access to professional development training, and a shortage of facilities (Ginja & Chen, 2020; Shareefa, Zin, Abdullah, & Jawawi, 2019). Additionally, it is evident that the implementation of specific concepts of the DI model – content, process, product, and learning environment – was not carried out equitably and appropriately (Sari, Agustini, & Adnyani, 2020).

On the contrary, some studies reported a high level of DI adopted by teachers. For instance, participants in a study by Maeng and Bell (2015) reported evidence of instructional modifications and multifaceted instructional strategies that demanded considerable advance preparation. Moreover, Santangelo and Tomlinson (2012) confirmed that the participating educators' beliefs and practices were found to be harmonious with Tomlinson's model of differentiated instruction.

2.3. The Impact of Teachers' Qualification, SEN Training, and Teaching Experience

Many educators believe that factors such as teachers' qualification, knowledge and experience contribute to implementing differentiation strategies (Melesse, 2015; Suprayogi et al., 2017). Existing literature revealed that the two variables of experience and qualification have been widely investigated; however, these studies reported incongruent results. For instance, Rodriguez (2012) asserted that teachers' experience is among the most influential factors that could pave the way for better implementation of differentiated instruction. In contrast, McMillan (2011)

and Siam and Al-Natour (2016) contended that there is no relationship between teachers' years of experience with regard to their use of differentiation.

Similar to teachers' experience, the majority of the reviewed literature confirms that teachers' qualification predicts their implementation of DI (McMillan, 2011; Richards-Usher, 2013), while there are several studies that present opposing views revealing that there is no statistically significant difference among teachers with varying qualifications in their use of DI (e.g., Melesse (2015); Nedellec (2015); Suprayogi et al. (2017)). Moreover, there is a lack of research on other similar demographic factors, such as teachers' exclusive training on special educational needs (SEN) and their respective teaching grades or levels. Hence, existing literature displays lack of plausible evidence on variables that are linked with DI, thus its implementation warrants further research in these areas.

3. METHOD

The current study employs a descriptive, cross-sectional survey design (Creswell, 2014) as it allows the collection of a wide variety of information on the participating teachers, including their demographic details as well as their perceptions and implementation of DI in their respective classrooms.

3.1. Population and Sampling

The study was conducted in the Maldives, and the target population of this study is teachers working in Maldivian schools. A total of 262 K-12 teachers were conveniently selected to participate in this study.

3.2. Instrumentation, Data Collection and Analysis

The study collected data through the methods of a descriptive survey, with two Likert type scales investigating (1) teachers' perceptions of DI – by adopting items modified from the scales of Baxter (2013), Brentnall (2016) and Richards-Usher (2013), and (2) teachers' implementation of DI – with adapted items from McMillan (2011). The survey was conducted online using Google Forms. Descriptive statistics, including cross-tabulation, were used in this study as the method of data analysis using the statistical programme SPSS 21.0.

3.3. Validity and Reliability

To ensure the validity and reliability of the study, the modified questionnaire was pilot tested, and mandatory changes were made to the instrument. In addition, the Cronbach's alpha coefficient was calculated for each construct of the instrument, the results of which are shown in Table 1. As depicted, Cronbach's alpha for the scales range from 0.763 to 0.961, indicating good to very good internal consistency (Pallant, 2007).

Table 1. Reliability analysis.

Scale	Sub-scale	Alpha	No. of items
Perception	-	0.763	7
Implementation	Content	0.852	6
	Process	0.961	16
	Product	0.932	8
	Environment	0.870	5

4. FINDINGS

Table 2 shows the sample profile of the respondents. The majority of the respondents (119, 45.40%) had obtained a Masters' degree, while most of the participants were teaching in key stage 3 (63, 27.60%). Moreover, most of the respondents (118, 45.40%) have had SEN training by means of short-term professional development, whereas almost one-third of respondents fall into each of the three experience groups.

Table 2. Description of the sample.

Variable	Categories	Number	Percentage
Educational qualification	Diploma or below	45	17.20
	Bachelor's degree	98	37.40
	Master's degree	119	45.40
	Total	262	100.00
SEN training	No training	76	29.30
	Short-term professional development (PD)	118	45.60
	Part of pre-service training	53	20.50
	Specialized programme	12	4.60
	Total	259	100.00
Teaching experience	Less than 7 years	89	34.90
	7-15 years	88	34.50
	More than 15 years	78	30.60
	Total	255	100.00

4.1. Teachers' Level of Perception and Implementation of DI

In order to examine teachers' perception and implementation of DI, the mean scores of the scales were calculated. Next, the percentages less than and greater than or equal to the mean scores were calculated for the purpose of comparison. The results obtained are shown in Table 3. According to the results, while teachers have a generally positive perception of DI (mean = 28.23, SD = 5.49), the majority of teachers (52.80%) have better perception scores than the average. Likewise, teachers' level of overall implementation of DI is also at the high end of the scale (mean = 121.10, SD = 25.67), while the majority of teachers (52.30%) reported a higher score than the average.

Despite these positive results, an analysis of the sub-components of DI implementation shows mixed outcomes. In this regard, most of the teachers scored lower than the average for the sub-component of differentiation by content (51.10%) as well as for product (53.40%). On the contrary, the majority of teachers scored higher than the average for the sub-components of process (51.10%) and environment (53.10%).

Table 3. The mean scores of teachers' perception and implementation of DI.

Dimension	N	Min.	Max.	Mean	Standard deviation (SD)	Percentage	
						< Mean	≥ Mean
Perception	231	9	35	28.23	5.49	47.20	52.80
DI by content	262	4	30	20.02	4.97	51.10	48.90
DI by process	262	20	80	58.32	13.06	48.90	51.10
DI by product	262	0	40	26.13	7.38	53.40	46.60
DI by environment	262	0	25	16.63	4.76	46.90	53.10
Overall implementation	262	39	170	121.10	25.67	47.70	52.30

4.2. Difference in the Level of Perception Based on Teachers' Qualification, SEN Training, and Teaching Experience

Cross-tabulation was used as the primary statistical technique for investigating the difference in teachers' perception. For the independent variables, the categories reported in Table 2 were considered, while for the dependent variable (perception), teachers were categorized into two – those who scored less than the mean and those who scored greater than or equal to the mean.

Table 4 shows the results for the difference in perception based on educational qualification. According to the results, the majority of respondents scored higher than the mean both in the diploma or below group (59.00%) as well as in the bachelor's degree group (56.80%), whereas the majority of those in the master's degree group (52.90%) scored lower than the mean. This indicates the potential prevalence of lower perception among those with higher academic qualifications.

Table 4. Difference in teachers' perception based on educational qualification.

Perception		Diploma or below	Bachelor's degree	Masters' degree
Less than the mean	N	16	38	55
	%	41.00	43.20	52.90
Greater than or equal to the mean	N	23	50	49
	%	59.00	56.80	47.10
Total	N	39	88	104
	%	100.00	100.00	100.00

Table 5 shows the results for the difference in perception based on SEN training. According to the results, most of the respondents who had no training in SEN (58.80%) scored lower than the average. In contrast, the majority of teachers from the rest of the groups scored higher than the average. In this regard, while 55.30% of those who had only short-term training in SEN had higher than the average perception, the corresponding figure for those who had specialized SEN training is 75.00%. These results indicate a plausible positive association between training in SEN and the perception of DI.

Table 5. Difference in teachers' perception based on SEN training.

Perception		No training	Short-term PD	Part of pre-service training	Specialized programme
Less than the mean	N	40	46	18	3
	%	58.80	44.70	40.00	25.00
Greater than or equal to the mean	N	28	57	27	9
	%	41.20	55.30	60.00	75.00
Total	N	68	103	45	12
	%	100.00	100.00	100.00	100.00

Table 6 shows the results for the difference in perception based on teaching experience. According to the results, the majority of respondents who had less than 7 years of experience in teaching (67.10%) scored higher than the average perception. Likewise, most of those who had 7 to 15 years of experience (57.70%) also scored higher than the average. However, the majority of teachers who had more than 15 years of experience scored lower than the average. These results portray a possible inverse association between teaching experience and perception of DI.

Table 6. Difference in teachers' perception based on teaching experience.

Perception		Less than 7 years	7 to 15 years	More than 15 years
Less than the mean	N	26	33	50
	%	32.90	42.30	73.50
Greater than or equal to the mean	N	53	45	18
	%	67.10	57.70	26.50
Total	N	79	78	68
	%	100.00	100.00	100.00

4.3. Difference in the Level of Implementation Based on Teachers' Qualification, SEN Training, and Teaching Experience

The same procedure used to investigate the difference in perception was also followed to investigate the difference in implementation. Although the implementation of DI has sub-dimensions, the results reported here only incorporate overall implementation.

Table 7. Difference in the implementation of DI based on educational qualification.

Implementation of DI		Diploma or below	Bachelor's degree	Master's degree
Less than the mean	N	24	50	51
	%	53.30	51.00	42.90
Great than or equal to the mean	N	21	48	68
	%	46.70	49.00	57.10
Total	N	45	98	119
	%	100.00	100.00	100.00

Table 7 shows the results for the difference in DI implementation based on educational qualification. According to the results, the majority of teachers in the diploma or below group (53.30%) as well as in the bachelor's degree group (51.00%) scored less than the average, whereas the majority of those in the master's degree group (57.10%) scored higher than the average level of implementation. These results indicate a potential positive relationship between DI implementation and academic qualification.

Table 8 shows the results for the difference in DI implementation based on SEN training. According to the results, most of the teachers who have no SEN training (51.30%) scored lower than the average, whereas the majority of teachers from the rest of the groups scored higher than the average level of implementation. Further, the percentage of teachers scoring above average increases as the type of SEN training becomes more intense. These results indicate that teachers who have more SEN-specific knowledge and skills tend to use DI more than those with less knowledge and skills.

Table 8. Difference in the implementation of DI based on SEN training.

Perception		No training	Short-term PD	Part of pre-service training	Specialized programme
Less than the mean	N	39	57	24	4
	%	51.30	48.30	45.30	33.30
Greater than or equal to the mean	N	37	61	29	8
	%	48.70	51.70	54.70	66.70
Total	N	76	118	53	12
	%	100.00	100.00	100.00	100.00

Table 9 shows the results for the difference in DI implementation based on teaching experience. According to the results, most of the teachers who had less than 7 of years of experience (56.20%) scored higher than the average. Likewise, the majority of teachers who had 7 to 15 years of experience (52.30%) also scored higher than the average level of implementation. On the contrary, most of the teachers who had more than 15 years of experience (51.30%) scored lower than the average. These results portray a potentially negative association between experience and DI implementation.

Table 9. Difference in the implementation of DI based on teaching experience.

Perception		Less than 7 years	7 to 15 years	More than 15 years
Less than the mean	N	39	42	40
	%	43.80	47.70	51.30
Greater than or equal to the mean	N	50	46	38
	%	56.20	52.30	48.70
Total	N	89	88	78
	%	100.00	100.00	100.00

5. DISCUSSION AND RECOMMENDATIONS

In the current study, teachers generally revealed positive perceptions of DI, and this finding is compatible with a number of previous studies. For instance, teachers in [Burkett \(2013\)](#); [Chien \(2015\)](#) and [Dack \(2019\)](#) all illustrated a high level of perception of DI. The findings of these studies suggest that teachers consider differentiated instruction as a teaching strategy that can effectively address a wide range of diverse abilities among students. Teachers believe that when DI is employed in teaching, students' academic improvement, engagement, motivation, and behavior are all positively affected ([Bondie, Dahnke, & Zusho, 2019](#); [Ginja & Chen, 2020](#)). Further, positive perception is also associated with teachers' implementation of DI strategies. For example, empirical studies that investigated the relationship between teachers' perceptions and the implementation of DI ([Brentnall, 2016](#); [Richards-Usher, 2013](#)) indicated teachers' perceptions as a positive predictor of implementation. Therefore, it can be stipulated that, in the context of this study, there is a high possibility for using DI strategies since the teachers who took part in the study possess positive perceptions about the strategies.

With regard to the implementation of DI, the current study found that, overall, teachers implement differentiation strategies at a fairly high level. Nonetheless, it must be noted that these findings are based on data collected from teachers' self-reported survey questionnaires. There is a possibility that what was reported by the participating teachers may not be congruent with the reality in classrooms. Therefore, to confirm the accuracy of these findings, different types of data collection methods, such as lesson observations and document analysis of teachers' lesson plans, could be adopted.

In addition to the above, in-depth exploration of the findings indicate that teachers' implementation of DI in terms of *content* and *product* differentiation is lower compared to the other two sub-components – *process* and *environment*. Literature shows that inconsistencies in the implementation of these constructs are also apparent in the findings of other studies (e.g., [Sari et al. \(2020\)](#); [Strogilos, Lim, and Binte Mohamed Buhari \(2023\)](#)). It is, therefore, evident that teachers' lack of harmony in adopting adequate levels of differentiation across the four constructs of the DI model needs to be addressed by the relevant authorities, as it is mandatory for the effective implementation of the complete DI model.

With respect to teachers' perception and implementation of DI in conjunction with their qualification, specialized SEN training, and teaching experience, it was identified that teachers who have undergone special SEN training had higher perception and implementation compared to those who did not have this training. Also, it was found that teachers with more years in the profession did not perceive and implement DI any better than those who have less experience in the field. Likewise, it was discovered that qualified teachers tend to execute high levels of implementation of DI in their teaching. Many of these findings are congruent with what is found in literature (e.g., [McMillan \(2011\)](#); [Melesse \(2015\)](#); [Siam and Al-Natour \(2016\)](#)). Overall, the findings of the current study, in conjunction with existing literature, show evidence of the significant role of teachers' qualification as well as specific knowledge and training in the areas of differentiated instruction.

6. CONCLUSION AND IMPLICATIONS

The current study was conducted to (i) examine the level of teachers' perceptions and implementation of DI, and (ii) to investigate the difference in teachers' perception and implementation of DI with regard to their qualification, SEN training, and teaching experience. The most significant conclusion inferred from this study is that teachers' professional development and knowledge competency in terms of qualification and training plays a significant role in the successful implementation of differentiated instruction in diverse classrooms. It was evident that teachers' knowledge base is crucial, as they require more training on the utilization of differentiation techniques effectively in their classrooms. While the findings of the present study, particularly with respect to the implementation of DI, have limitations in the self-reporting methodology used for data collection, the practical and policy implications are still valid.

In this regard, it is of the utmost importance for schools and teacher training institutions to have consistent, relevant, and practical professional development and training on the topic of differentiated instruction. This should not be limited to initial teacher training but should extend to on-going training and professional development. Similarly, it is also important that teachers are exposed to authentic experiences of teaching using differentiated approaches. This could include field visits and observation of classes with teachers who have successfully implemented differentiated instruction. This type of professional development should be followed up with careful monitoring and guidance on the application of learnings acquired via field observation. Educational planners must ensure that initial teacher training institutions and schools work hand-in-hand to deliver coherent pre-service and in-service development programmes for teachers in the area of differentiated instruction. Through the means of effective training, all teachers working in contemporary classrooms will be able to identify keys to unlock the learning potential of their students by means of DI, and ultimately help them become life-long learners.

Funding: This study received no specific financial support.

Institutional Review Board Statement: The Ethical Committee of the Universiti Brunei Darussalam, Brunei has granted approval for this study on 12 February 2018 (Ref. No. 300/SBIE/UBD/10).

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: Conceptualization, data analysis, initial draft, M.S.; data analysis, findings, V.M.; overall alignment of the write-up, proofreading, W.C.H. All authors have read and agreed to the published version of the manuscript.

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