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Demystifying the Impact of Teachers' Qualification and Experience on Implementation of Differentiated Instruction

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According to many educators, teachers' knowledge and experience are identified as key factors that facilitate effective classroom instruction. The aim of this study was to investigate the role of teachers' experience and qualifications in the implementation of differentiated instruction (DI). The study employed convergent mixed method design with 400 teachers surveyed, out of which 16 were interviewed, and 8 teachers' classroom teaching sessions were observed. Both quantitative and qualitative approaches were used to analyze data collected from instruments that were adapted from previous studies. The survey data were analyzed using inferential statistics of ANOVA, while interview transcripts were analyzed using content analysis method, and observation checklists were analyzed using a mixed approach. Findings of these analyses showed that there is no significant difference in teachers' implementation of DI based on their experience, while teachers' qualifications showed otherwise. These findings indicate the importance of teachers' pre-service and in-service professional development in the area of differentiated instruction. Further research is required to confirm and cross-validate these findings in other educational contexts.

Keywords: differentiated instruction, experience, implementation, qualification, instruction

INTRODUCTION

Owing to the diversity of student needs, teachers in contemporary classrooms need to be proactive and creative in their teaching styles (Santangelo & Tomlinson, 2009; Tomlinson & Imbeau, 2013). Teachers need to be fully equipped with knowledge and skills related to teaching strategies and techniques. Evidence from literature reveals that differentiated instruction (DI) is an important instructional strategy that teachers can employ for successful curriculum delivery as it allows instruction that is aligned with student needs (Little, McCoach, & Reis, 2014; O'Hare & Lauria, 2011; Onyishi & Sefotho, 2020; Tulbure, 2011; Valiandes, 2015; Williams et al., 2013). When DI is employed in teaching, teachers modify curricular goals, teaching methods, resources, learning activities, and student products in order to maximize the learning opportunity for all the students in a classroom (Tomlinson et al., 2003).

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Literature offers evidence indicating that, as an instructional strategy, DI is often favored by more experienced teachers who have received extensive instructional training before they endeavor implementation of the strategies (Dack, 2018; Subban, 2006). Experienced teachers, especially those who have spent many years in the teaching field tend to be familiar with the curriculum they teach, when compared to those who have less years in the field (Brevik et al., 2018). Likewise, for effective enactment of instruction, the importance of teachers' qualification or professional development focused on the philosophy of teaching strategies are often highlighted by educators (see Dixon, Yssel, McConnell, & Hardin, 2014). Hence, owing to this significance, further investigations is required as the impact of teacher-related variables, especially teachers' experience and qualification necessitate greater insights. It is important to confirm if experienced or qualified teachers implement DI strategies any better than their younger or less qualified counterparts. Getting a better understanding about the impact of these variables will assist in identifying means that can enhance overall teaching and learning as well as the professional growth of teachers.

Existing literature revealed that teachers' experience and qualifications are widely investigated in relation to various instructional strategies. However, these studies report rather controversial results (see Colleen, 2002; Hargreaves, 2005; Hobson, 2008; McMillan, 2011; Melesse, 2015; Rodriguez, 2012; Siam & Al-Natour, 2016; Usher, 2013). Even though the variables are explored widely, there is a paucity of empirical studies which exclusively explored the impact of the two variables corresponding to teachers' use of DI strategies. Most of the studies that presented the above findings examined teachers' experience and qualifications as auxiliary components of the main study – as they present findings of the demographic variables of their samples. Most of these studies merely shed light on the reasons for the above results prevailed in that particular contexts of those studies. In addition to that, studies which investigated the variables have rarely employed intensive explorations such as use of mixed approaches with multiple means of data collection methods. The current status quo in literature therefore, indicates a great need to conduct in-depth explorations on the two variables associated with DI.

The aim of this study is to find the impact of teachers' experience and qualifications on their implementation of differentiated instruction. Accordingly, the current study is guided by the following two research questions.

1. Is there any difference in teachers' implementation of DI based on their experience?
2. Is there any difference in teachers' implementation of DI based on their qualifications?

Literature Review

What is differentiated instruction?

Differentiated instruction is an approach to teaching in which teachers adapt curricular materials, teaching strategies, learning events, resources, and student products to cater for their students' needs (Smale-Jacobse et al., 2019; Sun, 2021; Tomlinson, 2008a,

2008b; 2014; Tomlinson & Imbeau, 2013). The main aim of differentiated instruction is maximizing the potential of all students by proactively crafting the students' learning experiences. It is about facilitating students with equal opportunities to achieve their learning goals through the means of the curriculum adaptation (Suwastini et al., 2021). To make instructional materials differentiated, teachers plan their teaching based on assessments of students' readiness, preferred learning styles, and the objectives of the course (Prast et al., 2018; Waid, 2016; Watkins, 2013). With consideration of students' readiness, interest, and learning profiles, teachers can adapt and modify their instruction through the content, process, products and learning environment (Tomlinson, 2000b). In this study, the conceptual definition of differentiated instruction is described as an explanation of an approach that provides all students with opportunities for learning, while embracing their individual differences and needs.

The model of differentiated instruction

As the theoretical basis, this study is grounded on the concept of the DI model recommended by Tomlinson (2014). According to Tomlinson (2003), DI is an approach to teaching that advocates active planning for student differences in classrooms. It is a proactive, learner-centered instructional model that acknowledges the fact that students have individual learning styles, motivation, abilities, and readiness to learn (Tomlinson, 2008a). Tomlinson (1999) suggests that based on the mind-set of five specific principles, differentiation can by aligned through differentiation of content, process, product, and learning environment. In this differentiation process, a high focus is given to readiness, interest, and the learning profile of individual students. The concept of differentiated teaching thus, has a great impact in teaching all over the world, bringing major changes in the way we envisage and practice teaching and learning (Prast et al., 2018; Valiande & Koutselini, 2009).

Together with the DI model, teachers' experience and qualifications form the conceptual framework of this study. As depicted in Figure 1, teachers' experiences and qualifications are assumed to affect how DI components are implemented by teachers.

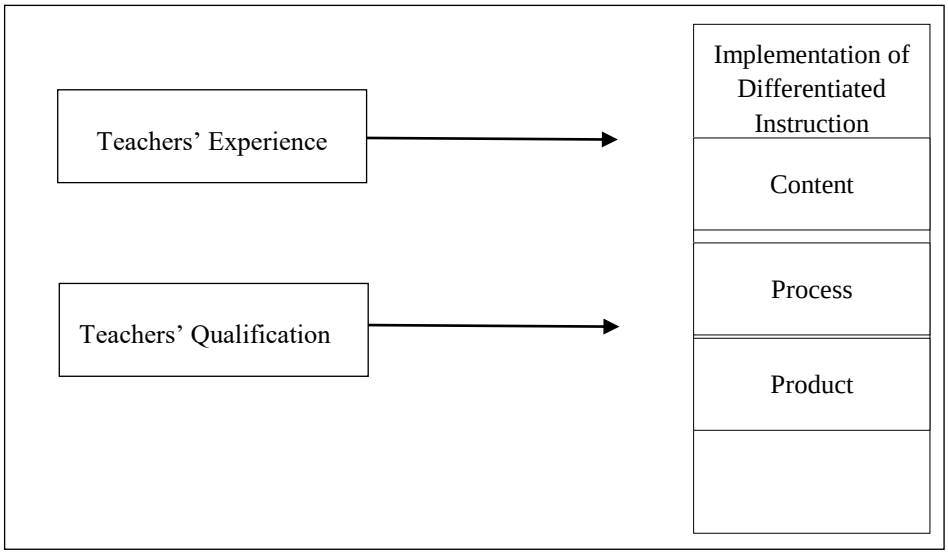

Figure 1
The conceptual framework of the study

Teachers' experience and use of DI

Researchers have identified a number of variables that might influence teachers' use of DI strategies, and teachers' experience is one amongst them. It is arguable if knowledge acquired during teacher education solely could influence teachers' instructional practices (Cochran-Smith, 2003; Maeng, 2016). Together with the knowledge, teachers' differentiation practice in classrooms is crucial as seminal studies suggest teachers' experience is imperative for effective instruction (Brevik et al., 2018; Suprayogi et al., 2017).

In this study, teachers' experience is defined in relation to the duration a teacher has been working in the school system – taking the responsibility for planning and delivery of classroom instruction. Some scholars believe that teachers continue to improve in their effectiveness as they gain experience in the teaching profession. For instance, Kini and Podolsky (2016) analyzed the effect of teaching experience on student outcomes, and discovered that teaching experience, in terms of the number of years, is positively associated with student achievement. Likewise, with regards to practical use of DI, the stance on the importance of teachers' practical experience on using the strategies is strongly emphasized in recent research conducted in Chile, Cuba, Finland, Norway, and the United States (Hammerness & Klette, 2015; Jenset et al., 2017). Researchers of these studies assert that good teacher education links theory with practice by providing opportunities for teachers to enact and practice what they learn in teacher education. When facing challenges in the classroom, teachers without experience often struggle to apply the knowledge from their training into practice (Dixon et al., 2014; Santangelo &

Tomlinson, 2012). Wolff et al. (2015) analyzed differences in expert and novice teachers' views regarding classroom events and their relevance for classroom management. According to their findings, teachers' cognitive processing diverged significantly based on their experienced levels. Experienced teachers focused more on student learning and their ability to influence learning, while novices were more concerned with maintaining discipline and behavioral norms (Wolff et al., 2015).

Teachers' qualification and DI

Parallel to teachers' experience, researchers' also recognize teachers' educational qualification as a contributing factor for DI implementation (Casey, 2011; McMillan, 2011; Suprayogi et al., 2017). When teachers attain their qualifications, it is mandatory that the corresponding teacher education programs deliver adequate knowledge about DI and its application to teacher candidates. The guidance in teacher preparation programs requires to help future teachers to understand the conceptual approach in which their instruction is based on (Dixon et al., 2014; Geel et al., 2019). The core principles involved in such a conceptual approach includes clarity of learning goals, on-going assessment, and informing instruction adapted in response to students' readiness levels, interests, and learning profiles (Brimijoin, 2005). Undeniably today's classrooms are with students of varied interest, preferences, standards, and many more differences. As a response to this miscellany, it is essential to equip teachers with a knowledge-base such as DI that assists attending to the differences that students bring to the classroom (Hobson, 2008).

A review of pertinent literature has revealed several reports about the impact of teachers' experience and qualifications on teachers' adoption of DI, and confirmed that the two variables are critical (see Brentnall, 2016; Brevik et al., 2018; Colleen, 2002; Hargreaves, 2005; Rodriguez, 2012; Usher, 2013). On the contrary, empirical evidence from Melesse (2015), Moosa and Shareefa (2019), and Suprayogi et al. (2017) discovered incongruous results. More specifically, Moosa and Shareefa (2019) found that teachers' experience and qualifications are not adequate factors that could explain any differences in teachers' application of DI in their teaching. The authors found that neither teachers' experience nor certificates can estimate how DI is employed in teachers' lessons. Owing to these contradictory results, it can be believed that further studies are warranted to confirm the current literture on these two variables. It is, therefore, hoped that findings of this research would contribute to the limited literature that presents exclusive investigations about the two variables of teachers' experience and qualifications associated with differentiation. The findings could assist school leaders and curriculum developers in gathering pertinent information about teachers' professional development needs (Brigandi et al., 2019) that are related to the topic of differentiated instruction.

METHOD

This study employs the convergent mixed methods design (Creswell & Creswell, 2018), hence a mixture of both quantitative and qualitative approaches were adopted in the study. A mixed approach was used, because it provides a comprehensive analysis of the

research problem by offering a broader understanding from divergent views (Tashakkori & Teddlie, 2003). Researchers show a strong belief that use of a mixed approach would be more fruitful since the results obtained via the different methods can enrich and improve our understanding of the matter by providing answers to questions that are difficult to answer by a sole classical method (Lopez-Fernandez & Molina-Azorin, 2011).

Sampling and population

The present study was set up in Maldives. Hence, the target population of this study was all the elementary level mainstream teachers working in Maldivian schools. For the collection of both quantitative and qualitative data, the technique of stratified sampling (Kothari, 2004) was used to elicit samples for the study. Stratification of schools was distributed across four groups, based on having 25% of the student population in each stratum. This technique was used since the researcher intended to draw equal numbers of samples from each stratum so that the sample portrays a better resemblance of the whole population (Creswell, 2003). In order to do the stratification, schools were arranged from the lowest to the highest based on student population. Accordingly, amongst the 4,252 teachers working in elementary classes of the public schools in the country, a total of 400 teachers (100 from each strata) were selected for the survey, while 16 teachers were interviewed, and 8 teachers' lessons were observed.

Table 1 presents demographic details of the participants selected for the survey. The information depicts frequency distribution of teachers' experience and their qualifications. As seen from the table, among the participants 253 (67%) had less than 10 years teaching experience; 99 (26%) had 10 to 21years, while 28 (7%) had been teaching for more than 21 years. In terms of the teachers' qualifications, 75 (19%) teachers had doctoral or master's level teaching qualifications; 144 (37%) teachers had bachelors' degrees; and the rest had diploma or certificate level qualifications.

Table 1
Details of teachers who participated in the survey (N=400)

Characteristics		*n*	%
Gender	Male	59	15
	Female	341	85
Years in teaching	1 - 10	253	67
	11 - 20	99	26
	21 +	28	7
Qualification	PhD & Master's Degree	75	19
	Bachelor's Degree	144	37
	Diploma & Certificate Level	173	44

For the interview, 16 teachers were purposively selected from the four strata mentioned above. The interviewees, were nominated based on two criteria: i) their teaching qualifications and ii) number of years' experience in the field. Interview participants were chosen at the two extremes of the variables: a) least experienced, most

experienced, and b) least qualified, most qualified. Least experienced teachers were those who were found to be at the lowest end of the experience scale (with only one or less than a year of experience), while the most experience had the highest number of years (with 12 to 20 years of experience). Similar approach was used to select teachers for the qualification variable. Teachers with the least qualification had only a diploma or no qualification at all. On the other hand, the most qualified group had teachers with bachelors or master's level certificates. The main aim for this purposive selection was to use a method that can assist in the analysis and integration of the data obtained from the quantitative survey method. As such, selecting participants from the two ends of the spectrum would allow data enrichment, insightful analysis, and discussion that could corroborate findings with the research questions.

For the classroom observations, eight teachers were purposively selected, and these teachers were deliberately selected from the teachers who took part in the interviews. Similar to the interviews, these eight teachers were selected with equal representation of the two main variables, experience and qualification.

Instrumentation and data collection

Data for the study were collected using survey, semi-structured interviews, and classroom observations. A questionnaire adapted from McMillan's (2011) instrument was used for the survey. The Likert scale of the survey questionnaire had items which measured teachers' implementation level of DI strategies. For the interview, open-ended questions were asked to investigate teachers' level of DI implementation. An observation guide consisted of a rubric and observation checklist which were modified from the Differentiated Instruction Implementation Matrix (DIIM) (Downes, 2006) were adopted for the classroom observations. During these observations, the checklists were filled in, and anecdotal notes were recorded. This variety of data collection methods helped to confirm triangulation and consistency of the findings.

Data analysis

Data collected from the survey were analyzed using Statistical Package for the Social Sciences (SPSS) 21.0. Before analyzing the survey data, reliability checks were performed using Cronbach alpha. The items on the scale were found to have an alpha coefficient of .92 in overall. Inferential statistics of One-way Analysis of Variance (*ANOVA*) were employed to analyze differences in teachers' implementation of DI based on their experience and qualifications.

For the interview, the general inductive process with content analysis (Creswell, 2012) was used. For the ease of data retrieval and generating codes and themes, the software ATLAS.ti7 was used as an aid, and flow charts that indicate the connection between the codes and their categories were produced using the software.

To analyze data collected from the observations, data were analyzed using a mix of both quantitative and qualitative approaches. To analyze the checklist, overall mean score of DIIM was calculated for each participant. The anecdotal notes were analyzed qualitatively using content analysis methods.

FINDINGS

Based on the three types of data, the analysis results are presented separately in the order of the research questions (RQ), in the following sections.

The difference in teachers' implementation of DI based on their experience

Survey results

The hypothesis formulated to answer the first research question ("Is there any significant difference in teachers' implementation of differentiated instruction based either on their experience?") is as follows.

$H_0$1: There is no significant difference in teachers' implementation of DI based on their experience.

One-way *ANOVA* was conducted to explore the difference in teachers' implementation of differentiated instruction against their experience. With regard to the hypothesis, the results in Table 2, show that there was no statistically significant difference at the $p < .05$ level in teachers' implementation of DI based on their experience (F (2,379) = 1.914, p = .149).

Table 2
Teachers' implementation of differentiated instruction based on their experience

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1107.474	2	553.737	1.914	.149
Within Groups	109068.366	377	289.306		
Total	110175.839	379			

The corresponding descriptive statistics for the analysis are given in Table 3. According to Table 3, the mean scores of the groups were relatively close to each other (M = 127.80, M = 131.48, and M = 129.89 for Groups 1, 2, and 3 respectively). When the mean scores of the three groups are compared, strikingly it shows that the highest score was achieved by the teachers who had 10 to 20 years of experience, while the least experienced teachers attained the lowest score for implementation of differentiated instruction.

Table 3
Descriptive statistics for teachers' implementation of differentiated instruction based on their experience

Experience Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Group 1	228	127.80	17.696	1.172	125.49	130.11
Group 2	124	131.48	14.912	1.339	128.83	134.13
Group 3	28	129.89	19.846	3.751	122.20	137.59

Group 1- 10 or less years
Group 2 - 10 to 21 years
Group 3 - More than 21 years

However, the difference between the three groups is not that significant with few points between each pair of groups. Consequently, as there was no significant difference between implementation of DI based on teachers' experience, the null hypothesis $H_0 1$ could not be rejected.

Interview data

During the analysis of interview transcripts, the researcher sought to capture the extent to which the critical indicators of differentiated instruction (Tomlinson, 2005) were evident in teachers' answers regarding DI implementation. Table 4 presents results identified about these indicators. The indicators are presented comparing the two dimensions of experience (***least experienced (LE) vs. most experienced (ME)*** separately.

The overall findings revealed from the interview data is that implementation of DI strategies did not have any difference amongst experienced or novice teachers. For instance, a newly enrolled teacher with only one year's experience reported that "…actually compared to the time I do not get it done frequently. Daily I can't do it. I only do it whenever I get time…it's always same work and same exercise". On the same notion, a teacher with 17 years of experience confessed that "due to the time factor and the carelessness in our planning, DI is not implemented properly". Further, another experienced teacher admitted the low level of differentiation by claiming the barriers they experience such as high workload, class size, and the lack of time they get for the preparation. As discovered from interviews of both the two groups, teachers had very little or an unremarkable level of differentiation in their teaching. These findings corroborate with the survey findings indicating that teachers' experience is not a determinant factor for DI implementation.

Table 4
Results of the interview data

DI Indicators	*Least Experienced (LE) vs. Most Experienced (ME)*
a. Flexibility of time, space, and materials	Both *LE and ME teachers* offered minimum flexibility to their students. It was found that in overall, the choices offered to students in terms of time, space, and materials were highly limited in all teachers' instructions.
b. Flexibility of grouping	There was no evidence that the learning activities provided opportunities for students to work with a wide variety of peers, hence lack of flexibility for working with homogeneous and heterogeneous groups was evident in both LE and ME teachers' lessons.
c. Use of assessment	Compared to LE teachers, teachers with more experience made better use of varied types of assessments; based on the assessments they re-teach students if deemed necessary. Nevertheless, it was discovered that both LE teachers and ME teachers did not correctly employ techniques of continuous assessment. Both the groups admitted that the level of implementing continuous assessment was minimal.
d. Planning for differentiated instruction	ME teachers reported that lesson planning was done based on the curriculum components complimented by the assessment of student learning. Both LE and ME teachers admitted that, their lesson plan documents were not explanatory, not giving details about how differentiation would take place in the lessons.
	Most teachers in both groups admitted that DI was not implemented at a satisfactory level. All the teachers openly disclosed the limited use of differentiation in their instruction. The analysis revealed that teachers in both LE and ME groups rarely implemented DI strategies.

Classroom observations

During the data collection process, each of the selected eight teachers was observed twice, and the lessons were rated using a checklist. The checklist had seven different domains. Under each of these domains, there were three to five items that correspond to the key indicators of DI. These items were given in four different levels of proficiency: novice, apprentice, practitioner, and expert. A rubric was modified and used to guide scoring for these items. When analyzing the checklists, mean scores of all the teacher's observations (two lessons for each teacher) were calculated by computing results of each of the seven domains separately. Findings were then compared and cross-checked on the basis of the individual teachers' experience respectively. Table 5 presents mean scores and percentages of the respective domains of the checklists. The table presents the details of the differences between Least Experienced (LE) and Most Experienced (ME) teachers' results.

In addition to the checklist, anecdotal notes were recorded, and to verify the results of the checklist, analysis of the notes were compared and merged with the overall mean scores of the checklist items. Hence, the overall mean scores embedded with the field notes obtained from each participants' two lesson observations would represent the participants' overall implementation level of DI. The goal of identifying the overall scores was to understand teachers' proficiency level in implementing differentiated strategies.

Table 5
Implementation of DI based on experience

Evidence of implementation	Least Experienced				Most Experienced			
	Novice	Apprentice	Practitioner	Expert	Novice	Apprentice	Practitioner	Expert
Domain 1	2	1	1	0	1	1	2	0
	50%	25%	25%	0%	25%	25%	50%	0%
Domain 2	3	1	0	0	1	2	1	0
	75%	25%	0%	0%	25%	50%	25%	0%
Domain 3	3	1	0	0	2	1	1	0
	75%	25%	0%	0%	50%	25%	25%	0%
Domain 4	2	2	0	0	0	2	2	0
	50%	50%	0%	0%	0%	50%	50%	0%
Domain 5	1	3	0	0	0	4	0	0
	25%	75%	0%	0%	0%	100%	0%	0%
Domain 6	4	0	0	0	0	2	2	0
	100%	0%	0%	0%	0%	50%	50%	0%
Domain 7	4	0	0	0	2	2	0	0
	100%	0%	0%	0%	50%	50%	0%	0%

Following is a presentation of the observation findings with regard to the details of the two variables.

Domain 1 - Quality Curriculum and Lesson Design indicates the presence of the quality of curriclum focusing on the lesson objectives. As seen from the Table 5 , ME teachers had better practice of using quality and clarity of lesson objectives, and communicating the learning goals with their students. The analysis shows that among the observed lessons, half of the ME teachers' lessons were at the practioner level, while only one of the LE teachers reached the practitioner level.

Domain 2 - Preparation for Learning and Response to Learner Needs indicates the use of pre-assessment and proactive preparation, while scaffolding for struggling learners and challenging the advanced ones. Results of classroom observations suggest that compared to the LE teachers, the ME teachers show better competency in preparing and attending to learner needs. Specifically, both the observed lessons of teacher A of the ME group reflected her proficiency in attending to learning needs of the struggling learners and advanced learners in her class. Anecdotal notes revealed that she consistently used a variety of tasks and procedure that were alligned to the individual

students' levels and needs. In contrast to this, LE teachers were using same activities uniform to everyone in the class regardless of their varied readiness.

Domain 3 focuses on *The Instructional Practices* such as lesson organization, modes of instruction, instructional strategies and best practice, engagement capacity of the activities, and intellectual development. Among these items, almost similar results as the previous domain were seen from both the groups of least and most experienced teachers. During the observation, it was detected that both the least experienced teachers lacked capacity to engage students into their activites.

Domain 4 - Classroom Routines include DI indicators that relate to teachers' capacity to create flexible instructional arrangements and to develop and conduct multiple meaningful tasks for students. Similar to the previous domains, in this domain also, the scores for teachers in the ME group show higher proficiency than LE teachers. The ME teachers' lessons fall within the middle two categories (apprentice and practioner), while the LE teachers' lessons land in novice and apprentice level.

Domain 5 is about the use of *Student Assessment*, and it corresponds to the use of formative and summative assessments to assess student learning. The domain also seeks to explore the use of quality rubrics and guidelines during the lessons. As seen from Table 5, there was less discrepancy between the two groups of LE and ME teachers. Teachers of the ME group demonstrated that 100% of the lessons were at apprentice level, while 75 % of teachers of the LE were at the novice level.

Domain 6 – Positive, Supportive Learning Environment reflects the extent to which teacher facilitates a collaborative learning environment that creates a positive community of learners. In terms of creating such an environment, none of the LE teachers attained a score higher than novice. On the other hand, the ME teachers were at the level of apprentice and practitioner. Anecdotal records also revealed LE teachers' lack of consideration in fostering respectful behavior towards their students.

Domain 7- Evidence of Differentiation demonstrates teachers providing students multiple avenues about the content, process, and product being differentiated in relation to the students' readiness or learning profiles. As seen from Table 5, none of the LE teachers practiced any of such activities for their students in any of the observed lessons. These two teachers' lessons were mostly teacher centered, showing less consideration to the learning needs of students. As gleaned from the findings, experienced teachers also practiced differentiation at a very lower level.

The analysis of the classroom observation revealed that overall, teachers adopt differentiation at a minimal level. All in all, consistent findings from the survey, interview, and observation, confirmed that there was no difference in teachers' implementation of DI based on their experience. It revealed that experienced teachers did not implement differentiated instruction any better than less experienced teachers.

The difference in teachers' implementation of DI based on their qualification

Survey results

The hypothesis which was based on research question 2, "Is there any significant difference in teachers' implementation of differentiated instruction based either on their qualifications?", tested if there was a significant difference in teaches' implementation of DI based on their qualifications.

One-way *ANOVA* was conducted, and the results, in Table 6, show that there was a statistically significant difference at the $p < .05$ level in teachers' implementation of DI based on qualifications (F (2,391) = 3.733, p = .025). As there was an overall significant difference in teachers' implementation based on their qualifications, the null hypothesis $H_0 2$ was rejected. Despite the statistical significance, the actual difference in mean scores between the groups was quite small as the eta square was .02.

Table 6
Teachers' Implementation of Differentiated Instruction Based on their Qualifications

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2141.204	2	1070.602	3.733	.025*
Within Groups	111568.017	389	286.807		
Total	113709.221	391			

*p is significant at 0.05 level.

In order to find out where the difference exactly lies, post-hoc comparisons using the Tukey HSD were followed. The comparisons indicated that the mean scores for Group 1 with PhD and Master's qualification (M = 133.52, SD = 16.106) was significantly different from Group 3 with Diploma and below qualification (M = 127.14, SD = 18.002). However, the mean scores for Group 1 with PhD and Master's qualification (M = 133.52, SD = 16.106) was not significantly different from Group 2 with bachelor degree qualification (M = 128.77, SD = 16.030). Similarly, the mean scores for Group 2 with bachelor degree qualification (M = 128.77, SD = 16.030) was also not significantly different from Group 3 with diploma and below qualification (M = 127.14, SD = 18.002). The mean scores for the groups are shown in Table 7.

Table 7
Descriptive statistics for teachers' implementation of differentiated instruction based on their qualifications

Qualification Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Group 1	75	133.52	16.106	1.860	129.81	137.23
Group 2	144	128.77	16.030	1.336	126.13	131.41
Group 3	173	127.14	18.002	1.369	124.44	129.84

Group 1 - PhD and Master's
Group 2 - BA Degree
Group 3 - Diploma and below

The above results indicate that the higher qualification teachers possess, the higher their level of implementation of DI is. Therefore, the results confirmed the fact that teachers' level of qualification is a significant determinant for DI implementation.

Interview data

Table 8 presents results identified about the critical indicators of differentiated instruction (Tomlinson, 2005b) comparing the two dimensions of qualifications, least qualified (LQ) and most qualified (MQ) separately.

The overall findings revealed from the interview data is that teachers with a higher level of qualifications did use DI strategies better than teachers with lower qualifications. These findings corroborate with the survey findings indicating that teachers' qualification is a strong determiner for DI implementation.

Table 8
Results of the interview data

DI Indicators	*Least Qualified (LQ) vs. Most Qualified (MQ)*
a. Flexibility of time, space, and materials	There was lack of flexibility of time in both the groups while MQ teachers provided more flexible space and environments to their students than LQ teachers. Likewise, compared to LQ teachers, MQ teachers used more variety and flexibility in the learning materials they offer to students.
b. Flexibility of grouping	Both the groups frequently used cooperative learning activities in their teaching which required flexible grouping. However, evidences about such flexibility of working with homogeneous and heterogeneous groups was less in LQ teachers than MQ teachers.
c. Use of assessment	Although MQ teachers believed that assessment of their students' learning was not done at its best, it was found that they were more proficient compared to LQ teachers.
d. Planning for differentiated instruction	LQ teachers admitted that not much planning was done intentionally on using differentiated instruction, while MQ teachers reported otherwise.
	The analysis revealed that MQ teachers used DI more frequently and consistently than LQ teachers. As explained by the MQ teachers, exceptional learners were well attended in their instruction.

Classroom observations

Table 9 presents details of the differences between the Least Qualified (LQ) and Most Qualified (MQ) teachers. Details of the analysis of the observation checklist and anecdotal notes were ensued in the following sections.

Table 9
Implementation of DI based on qualifications

Evidence of implementation	Least Qualified				Most Qualified			
	Novice	Apprentice	Practitioner	Expert	Novice	Apprentice	Practitioner	Expert
Domain 1	0	2	2	0	0	2	2	0
	0%	50%	50%	0%	0%	50%	50%	0%
Domain 2	1	1	0	2	0	1	2	1
	25%	25%	0%	50%	0%	25%	50%	25%
Domain 3	0	2	1	1	0	0	2	2
	0%	50%	25%	25%	0%	0%	50%	50%
Domain 4	0	1	3	0	0	0	3	1
	0%	25%	75%	0%	0%	0%	75%	25%
Domain 5	2	2	0	0	0	0	4	0
	50%	50%	0%	0%	0%	0%	100%	0%
Domain 6	0	1	2	1	0	0	3	1
	0%	25%	50%	25%	0%	0%	75%	25%
Domain 7	2	0	2	0	0	2	2	0
	50%	0%	50%	0%	0%	50%	50%	0%

The following is a presentation of the observation findings derived from both the checklist and anecdotal notes.

Domain 1 - Quality Curriculum and Lesson Design. The results in Table 9 shows that, teachers' qualification did not bring any changes in terms of how the objectives were specified and communicated with the students. It was found that both the groups were at the apprentice and practitioner level equally.

Domain 2 - Preparation for Learning and Response to Learner Needs. It was noticed that all the highly qualified teachers showed proficiency above the novice level, while one of the teachers from the LQ group stays at the novice level.

Domain 3 - The Instructional Practices. When the results of the LQ and MQ teachers were compared, it was identified that the proficiency level of all the teachers in both the groups were above novice level. The MQ teachers' instructional practices rest at practitioner or expert level in all their observations. These teachers presented the content of their lessons in a logical progression by tapping into the students' prior knowledge and relating to their everyday life.

Domain 4 - Classroom Routines. The MQ teachers displayed a more proficient level of flexible grouping, flexible use of space, time, and materials used for their students. All the observed lessons of these qualified teachers were at practitioner level and above. The activities of these teachers were considered as structured and productive compared to the lessons of LQ teachers.

Domain 5 - Student Assessment. Results reveal that formal and informal assessment were used appropriately to a remarkable level. All the lessons observed from the MQ group of teachers were at the practitioner level, showing a good indication that the information obtained from the assessments were used to gauge student learning.

Domain 6 – Positive, Supportive Learning Environment. The results in Table 9 show that both the LQ and MQ groups of teachers demonstrated relatively very close findings in terms of creating a positive and supportive learning environment. Data from the observations of both the MQ teachers reveal a remarkable level of collaboration and collegiality in their lessons.

Domain 7- Evidence of Differentiation. Among the qualification group of teachers, MQ teachers performed more proficiently in differentiating the components of DI. Teacher B of this group was observed providing students opportunities to engage with content or process based on differences in their students' readiness.

The analysis of the classroom observation indicate that highly qualified teachers employed implementation of differentiated instruction better than less qualified teachers. Consistent findings from the survey, interview, and observation confirmed that in overall, teachers' level of qualification is a significant determiner for DI implementation.

DISCUSSION

DI implementation based on experience

In spite of the rich literature which advocates the importance of teachers' experience, (Berger et al., 2018; Kini & Podolsky, 2016; Wolff et al., 2015), finding of the present study discovered that teachers' implementation of DI was not affected with their experience. Corroborated findings of survey, interview and observations revealed that teachers' increase in experience does not guarantee any better use of DI in teaching. As seen from the analysis, there was not much difference with how DI strategies were adopted by novice teachers, nor with teachers who had more than 20 years of experience.

Unlike the present study, many of the previous studies project evidence showing that expert teachers were significantly more effective than their counterparts. Those researchers stressed the importance of teaching experience, because it was not only associated with the instructional practices, but also related to teachers' self-efficacy, and general conceptions about teaching and learning (Berger et al., 2018). Additionally, research conducted exclusively on DI (e.g. Rodriguez, 2012; Hargreaves, 2005) reported that experience was among the top key factors in facilitating DI implementation. When teachers have many years of practice in teaching, they are able to

use their memory of classroom events to make sense of the current situation by aligning it to similar situations they have experienced many times before (Wolff et al., 2015). Hence, owing to the prominence of teachers' ongoing practice and familiarity in the field, many researchers have emphasized the importance of field experience in teacher training programmes (Acquah & Partey, 2014). It is because, for beginning teachers, when they lack experience, they have major focus on discipline and student behavior rather than the pedagogical choices they provide to create and sustain learning in the classroom, (Wolff et al., 2015). Novice teachers often demonstrate a lack of attention to student learning while experienced ones construct richer and more meaningful representations of classroom events.

In spite of the above facts, when the existing literature were reviewed extensively, many of the studies can be found to be consistent with the results of the present study. For instance, empirical studies of Hobson (2008), McMillan (2011), Melesse (2015), and Siam and Al-Natour (2016) indicated that the relationships between teachers' years of experience were not statistically significant in regards to their use of differentiation. Some of these researchers argued that experienced teachers lack training on recent instructional strategies and as a result, they have difficulty trying new teaching style when the ones they already have been using is working. Another important fact is that, owing to the difficult challenges teachers encounter in their profession, experienced teachers' motivation to become more skilful with the latest instructional strategies gets affected. Some of these negative experiences may include classroom management and discipline, adjustment to the physical demands of teaching, managing instructional tasks, and sacrificing leisure time (Ginja & Chen, 2020; Iliya & Ifeoma, 2015). Therefore, despite the numerous professional development trainings conducted in schools, the trainings become less productive as there would be little or no improvement in teachers' use of new strategies and techniques. Subsequently, experienced teachers may have the feeling that such professional training are not with much necessity as their current use of instruction is effective in catering for their students' needs. However, in reality, the instruction may be more fruitful if recent and effective strategies are incorporated into their teaching, rather than sticking to their 'tried and trusted' conventional methods (Colleen (2002).

Considering the above, it would be dangerous to assume that teachers' implementation of strategies like DI, increases as they clock up more years in their teaching job. It can be believed that the use of such contemporary teaching strategies does not naturally take place as a result of daily encounters in the teaching profession. Rather, implementation of DI is the result of deliberate endeavors combined with adequate knowledge and intention to really use it and engage in the process; as seen in the 'theory of situated learning' (Lave & Wenger,1991). According to the 'theory of situated learning', teachers need to be exposed to good modelling by teacher educators during their pre-service and in-service training. In the same manner, senior colleagues and school management are also required to encourage and demonstrate how the methods can be practically applied in daily teaching and learning processes. It is convincing that, when teachers engage with experienced practitioners, they become part of a community of

practice and over time, gain mastery of desired knowledge and skills (Lave & Wenger,1991).

DI implementation based on qualification

There is a growing body of literature which provides evidence suggesting the importance of teachers' qualifications as they influences classroom instructional practices leading to student achievement (Kola & Sunday, 2015; Mak, 2016; Mcdonald et al., 2005). Likewise, many of the studies confirmed that teachers' educational level had an overall positive relationship with teachers' instructional practice such as differentiated instruction (Colleen, 2002; McMillan, 2011; Usher, 2013). In harmony with these literature, corroborated results of the present study showed that highly qualified teachers were more proficient in using DI than teachers with lower qualifications. It was confirmed that when teachers undergo higher level training, their use of differentiation strategies increases.

Teachers' qualifications do not only mean a certification they possess, but it comprises other variables such as teachers' efficacy that is fundamental to becoming an effective teacher. Several of the past studies discovered correlation between teachers' qualifications and teacher efficacy (Alrefaei, 2015; Guo et al., 2016; Kurt et al., 2014; Zabrina-anyagre & Asiedu-addo, 2017). When teacher efficacy is high, it leads to better academic results (Kola & Sunday, 2015). In addition, teacher qualifications are also related to teachers' overall practice in the classroom; for instance, highly qualified teachers interact with students more responsively (Mcdonald et al., 2005).

The reasons for the correlation between teachers' qualifications and DI implementation reveals the fact the training courses and teacher development sessions teachers undergo in the context of the study have a positive effect on their teaching and learning processes. It can be believed that the content delivery in these knowledge transferring process is effective, showing teachers' familiarity and understanding about the DI components high in overall. Therefore, it is reasonable to believe that if teacher educators and school leaders diligently incorporate exposure of DI into teachers' professional development and training, there is fair chance for a better use of the strategies in teachers' daily instructional routine (Santangelo & Tomlinson, 2012). When teachers are provided with such adequate knowledge and support from the school management and other stakeholders, possibilities for consistent use of the strategies are very likely.

CONCLUSION AND IMPLICATIONS

The aim of this study was to investigate the difference in elementary teachers' implementation of DI based on their experience and qualifications. Findings of this study showed that teachers' experience does not have a significant impact on their use of differentiation strategies, while qualified teachers showed frequent and consistent use of the strategies compared to their colleagues with lower qualifications. These findings confirm that teachers' qualification is a possible determinant for successful implementation of DI, however, teachers' experience cannot be considered as such.

Regardless of the above findings, it can be believed that, if teachers are exposed to differentiation strategies during their tenure, the study might have demonstrated a different set of results. If the educational system in schools gives teachers proper guidance and assistance on using the strategies, there is a high chance for its application in the instructional process. At the same time, despite the positive impact of qualifications, we do believe that teachers' qualification with explicit knowledge and training on DI would have a stronger impact than what was discovered in this study.

One of the main contributions of this study lies in addressing the scholarly gap in the literature investigating the relationship between teachers' experience and qualifications against DI implementation. Existing literature fails to provide a conclusive judgment on this topic. Hence, the two major findings of the present study are assumed to add richness to the existing knowledge-base. Nevertheless, we believe that further examination of these variables in different contexts deems necessary to confirm these findings. Future research can be conducted by comparing teachers with distinct subject disciplines as well as at different grade levels of various schools.

One of the direct and obvious implications of the above findings is related to teacher educators. Different courses conducted by teacher preparation institutions require to include relevant content about the concept of DI into their training programmes. As such, teacher educators need to ensure that the approach is well understood and interpreted by teachers before teachers venture into the profession. In the same manner, teacher educators' modelling of DI in their own teaching is crucial to develop novice teachers' understanding and interpretation of the concept.

Additionally, school leaders need to conduct effective professional development programs on the topic of DI. These training programs must be conducted in a way that it is productive, and continuous. When staff development is designed and conducted with these characteristics, it empowers teachers, and provide them a pathway for successful implementation. The undeniable fact is, if teachers lack sufficient knowledge and exposure on using the strategies, it is less likely for them to use differentiation in teaching, even though they have been in the profession for a long period of time.

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