



The effects of teachers' professional development activities on differentiated instructional practices and students' learning engagements and outcomes in Oromia Regional State, Ethiopia

Girma Moti Geletua^{1*}, Dawit Mekonnen Mihirete²

¹PhD Candidate in Curriculum Studies, Addis Ababa University, Addis Ababa, Ethiopia

²PhD in Curriculum Studies, Addis Ababa University, Addis Ababa, Ethiopia

Abstract

The study was aimed at examining the effects of professional development activities on differentiated instruction and students' learning engagements and outcomes in Oromia Regional State. A mixed method with concurrent triangulation design was used. The samples were selected from a total of 317 respondents by using stratified, simple random sampling and availability sampling techniques. The data were collected by using questionnaires, interview, classroom observation and document examination, and analyzed by using different statistics followed by thematic narration. The objective of differentiated instructional practices was not aligned with the learning engagements and outcomes of diverse learners [F (2, 309) = 4.658, p = .000, p < .05]. The practices of students' learning engagements were not empowered due to less differentiation of contents, process, product, resources and learning environment [F (3, 309) = 4.698, p = .003, p < .05]. It didn't address the diverse needs of gifted, visual, auditory, kinesthetic and students with learning difficulties. Therefore, factors that affect the implementations of differentiated pedagogical practices to engage learners and assists them to realize their prioritized needs and expectations in the classrooms should be recognized. The contextualization, conceptualization and adaptation of differentiated instruction should be realized by giving ongoing professional development training for teachers. The best practices should be contextualized, conceptualized, adapted and connected to real life of learners and improve their learning engagements and outcomes.

Keywords: *Contextualization, conceptualization and adaptation; differentiated instruction; diverse learning styles; learning engagements and outcomes*

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* Girma Moti Geletua, ORCID ID: 0000-0002-4962-037X

girmam2015@gmail.com ; girmamgeletu5@gmail.com ; mshgirma15114@gmail.com

1. Introduction

1.1 Background of the Study

Educational researchers across much of the world indisputably agreed that quality of education is greatly determined and sustained by the quality of teaching forces to handle dynamic complexities to produce citizens who manage their lives in a continually changing world. The quality of citizens essentially depends on the quality of education, and ultimately, the quality of education relies on the quality of teachers who are educating young citizens (Kothari, Patel and Shelat, 2012). The quality of education system cannot exceed the quality of its teachers (McKinsey & Company, 2010), and student's learning is the consequence of what goes on in the classrooms (Barber & Mourished, 2007). Likewise, Darling-Hammond, Hyler & Gardner (2017) suggested that implementation of teachers' effective professional development features improves teachers' instructional practices in the classrooms. And, the success of teachers' professional development ultimately depends on three intersecting contexts such as the participant level (the learner and provider), the type of contexts (targeted knowledge, skills and dispositions), organization and facilitation of educational process (Desimone & Garet, 2015; Egert, Fukkink, & Eckhardt, 2018). As knowledge brokers, teachers transfer knowledge from those who possess it to those who need to have it (Margaret, 2021). Teachers are represented as midwives of society without whom the future of society will be malformed (Goodson and Hargreaves, 2002). A professional teacher has a responsibility to fulfill students' learning needs and gives quality instructional services without any students' exception (Tatto, 2021). Therefore, professional development practices are at the center of enhancing teachers' differentiated pedagogical practices and students' learning engagements and outcomes. Pertaining to the requirements of professional development, Girma, Dawit and Geberew (2021) reflected that it focuses on learning how to learn and transforming their knowledge into practices for the benefits of students' learning. However, the quality of instructional system has been challenged by the diversity of students such as their readiness, interests and learning profiles which didn't always adequately respond to students' varied needs of learning. Contextually, the instructional system tends to rely on the logics of teach to-the-middle or one-size-fits-all approach expecting all students to do the same activity, work at the same pace, do the same homework and take the same test through utilizing traditional pedagogical approach. Yet, achieving greater equity in education is a social justice imperative to increase the supply of skills that fuel economic growth and promote social cohesion (OECD, 2016; Mirici. 2019).

Moreover, learners do not have the same level of development that instructors need to put utmost effort so that learners demonstrate their success in different manners (Jackson & Davis, 2000). An obvious feature of differentiated classroom is that it is

child-centered. This is a paradigm shift of emphasis from the teacher and instruction focus to the child and learning focus which means redefining the role as teacher. A teacher who differentiates instruction becomes both a facilitator and a collaborator (Heacox, 2012). However, Meyer, Rose and Gordon (2014) stated that a shared understanding of student diversity as dynamic and wide-ranging because none of these qualities resides entirely within an individual neither in their brains nor in their genes. Since no two children are exactly alike. Since, the personal qualities and abilities continually shift, and they exist not within the individual but in the intersection between the individual and their physical environment. Thus, Individual differences in our brains are not innate, but developed and malleable and the context has a huge impact. With this emphasis on diverse learning styles as a backdrop, Tomlinson (1999) encouraged teachers to personalize instructional activities to challenge students with a highly interactive, challenging and interesting curriculum. Teachers were encouraged to consider students' unique learning styles and differentiate educational activities presented in the class. In order to differentiate effectively and support individual and diverse students in the classroom, the teacher is required to be flexible in their approach to adjust learning environments. Differentiated instruction is proactive, inclusive, constructivist and requires an understanding of the learner's interactive learning patterns (Tomlinson, 2013). Specifically, differentiated teaching refers to methods teachers use to extend the knowledge and skills of every student in every classroom, regardless of their starting point.

The objective of differentiated pedagogical practices is to improve the performance of all students including those who are falling behind and those ahead of year level expectations. Differentiated instruction is the pedagogical approach of teachers who think creatively and flexibly when approaching teaching and learning (Subban, 2006; Subban & Round, 2015). The average classroom is heterogeneous with diverse ranges of learners from different cultural, social and educational experiences. The 'one-size-fits-all' learning pathway and 'teaching to the middle' ignores students who require different entry points in the learning continuum. Learners at risk of disengagement can be at any stage of schooling. Even, highly able or gifted students are at risk of learning disengagement (Winnebrenner, 1992). Therefore, differentiated teaching offers strategies to engage all students to personally invest in and take ownership of their learning regardless of their learning starting point or ability (Tomlinson and Tonya, 2013). Based on the student's readiness, interests and learning profiles, teachers can plan the learning sequence. Accordingly, Santangelo & Tomlinson (2012) and Tomlinson (2014) suggested that teachers may need to differentiate the (1) content-what students are expected to learn. (2) process-how teachers will teach and how students will explore or undertake their learning. (3) Product-how the students demonstrate their learning. (4) Learning environment-physical and affective nature of the classroom in flexible manner. Thus,

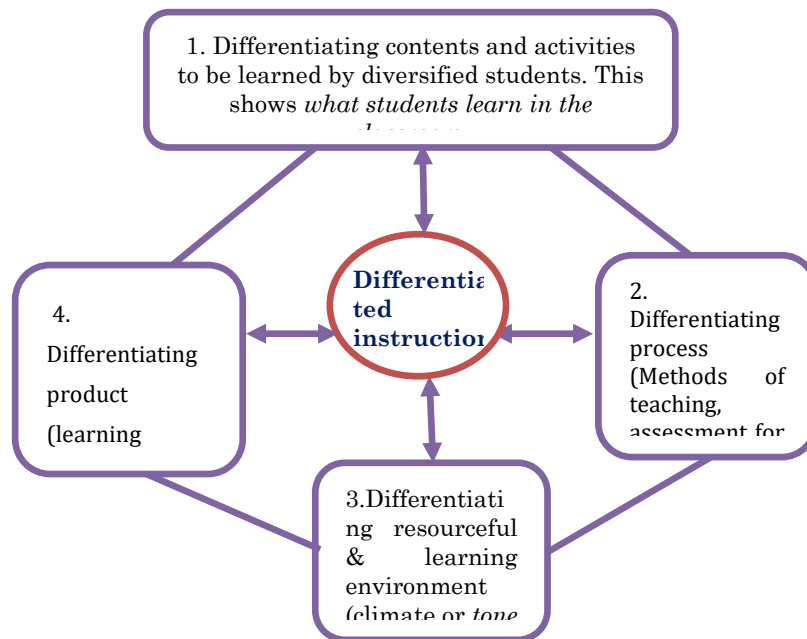
differentiated learning classrooms stimulate diverse learners and place them where they feel valued, safe and supported to take risks to their learning (Tomlinson, 1999; Tomlinson and Tonya, 2013; Tomlinson; 2014).

Differentiation is a pedagogical response rather than an organizational response by which teachers provide a variety of means for students to access information, master content, demonstrate their learning and work independently or with others. It is as a theoretical account for teachers to respond to students' diversity in heterogeneous classrooms (Tomlinson, 2004). Thus, differentiation transforms what goes on in classrooms to ensure that all students are provided with aptly tailored curriculum and a model of instruction to support their growth in knowledge, skills and understanding (Hall, Vue, Strangman, & Meyer, 2004). Culturally responsive teaching using cultural knowledge, prior experiences and performance styles of diverse students are essential to make learning more appropriate and effective for all learners in the classrooms (Girma and Abraham, 2019). Thus, institutionalization of culturally responsive pedagogy helps to address diversified learning needs of children in the classrooms.

On the other hand, inconsistency remains happen to be an obstacle in how differentiation is interpreted in pedagogical practice (Mills, Monk, Keddiea, Renshawa, Christie, Geelanb & Gowletta, 2014; Webster & Blatchford, 2018). This lack of consistency has altered the perpetuation of routinely-applied practices such as curriculum differentiation where different expectations are applied to different groups of students (Terwel, 2005). The structural differentiation within-class ability grouping was implemented through segregating students into groups on the basis of prior achievement (Deunk, Smale-Jacobse, de Boer, Doolaard & Bosker, 2018). These practices remain rooted in deficit thinking about students' potential and ability, and undermine the intents of differentiation to provide equitably for all students in heterogeneous settings. However, adapting and contextualizing best educational theories and practices into the classrooms improve teachers' professional practices and students' learning outcomes (Girma *et al.*, 2021). For the successful implementation of differentiated teaching and learning, teachers consider the learners' motives, abilities, interests and learning styles (Mest, 2016). Seldom, teachers pay more attention to the product and less to the content and differentiated learning process. Parents also show willing to collaborate with the school for this new way of welcoming instructional strategy (Ismajli & Imami-Morina, 2018) to assist children to research their zone of proximal development.

The diverse student characteristics have made differentiated pedagogical practices necessary for teachers to use appropriate and fitting teaching approaches (Heacox, 2012). In order to address students' learning diversity, several educational institutions have tried to design a more responsive pedagogy or differentiated instruction (Guay, Roy

& Valois, 2017). Although teacher's roles in differentiated classroom is multi-faceted, a teacher provides a range of differentiated learning experiences for the children, organizes the children for learning and uses time flexibly to suit children's needs (Nicolae, 2014). Furthermore, Tomlinson (2014) summarized that differentiated instructional practice prioritizes two preconditions while planning, implementation and evaluation. These are: (1). Knowing the students-the biggest mistake in teaching is to treat all children as if there were variants of the same individual and thus to feel justified in teaching them all the same subjects in the same way. The first step in knowing the children in your class are to understand who they are, what they already know and understand. (2). Organizing the classroom-carefully planned organization of the classroom is key to complementing differentiated teaching and learning and providing children with choices in terms of their learning. The theoretical frameworks of differentiate instructional practices in the classrooms is guided by the four principles and assumptions related to the works of Tomlinson and Tonya (2013) and Tomlinson (2014) who provide multiple approaches to the four elements. These are content (*what* students learn), process (*how* do students make sense of the information and ideas), product (*how* they show *what* they've learned) and affect/learning environment (*which* climate or tone in the classroom). This theoretical framework is pictorially summarized and presented in Figure 1 below:



Source: The ideas are adapted from (Tomlinson and Tonya, 2013 and Tomlinson, 2014).

Fig 1: Theoretical framework of differentiated instruction

The implementation of theoretical framework shown in Figure 1 clearly depends on the pre-assessments of students' differences in readiness, interest and learning profile. Differentiation can only be applied successfully if learners play central roles in the processes it entails. Hence, learners acquire skills related to self-directed learning and responsibility for their own learning. Teachers invest time and energy in teaching skills that empower learners to take control of their own learning process through provision of effective scaffolding for students via modeling, shared practice, guided practice, independent practice and student's application approaches (Sharratt, 2019). The differentiation process of contents and activities, process and product, instructional resources take place through pre-assessment, precision teaching, instructional scaffolding and flexible grouping of students. The activities are expected to be fitting to diversified needs of learners with learning difficulties, gifted, visual, auditory and kinesthetic learners, and other learners with multiple intelligences in the classrooms.

1.2. The Problem Statement

From the experiences of a researcher, some evidences showed that there are some attempts of implementing active learning and inquiry processes in the Ethiopian classrooms (Joshi & Verspoor, 2013). Pertaining to this, scholars suggested that teachers' participation in collaborative learning, reflective inquiries, induction, lesson studies and material development assist improvements of professional competencies required in the classroom practices (Sims & Fletcher-Wood, 2021). Yet, there are wider gaps in accommodating learners' diversity, episodic teachers' professional development practices, poor competency-based curriculum practices, weak participation of teachers in curriculum development and review process, and fragmented implementation of active learning methods and formative assessment techniques (Tilaye, Lavalley & Sapane, 2020). Thus, poor quality of classroom instructional system is related to teachers' quality in addressing learners' diversity in their classroom teaching (Tadesse, 2020). Although it is very essential to address students learning diversity, empowering leaning engagement and improving learning outcomes, the experiences of different countries demonstrated that differentiated instructional practices affected by many dynamics. It requires appropriate time to plan instruction and assessment (Nicolae, 2014), minimize large class-size, resources (Chien, 2015), professional support (Tadesse, 2020), stimulating learning environment, standardized schedules (Santangelo & Tomlinson, 2012), and teachers' understanding and skills (Whitley, Gooderham, Duquette, Orders, & Cousins, 2019). On top of comprehending the disadvantage of traditional teaching style, practically, they were using lecture method in their classrooms without considering the learning styles of diversified learners (Mest, 2016; Tesfaye, 2014; Tadesse, 2018). However, education policy encourages differentiated instructional practices in Ethiopian context (MoE, 2020) to address diverse learning styles of students (MoE, 2018). Yet,

teachers have limited perceptions towards the concepts of differentiated instruction and its actual practice (Tadesse, 2020), and its implementation didn't touch the ground. Furthermore, Girma (2022a) confirmed that teachers opportunities of getting appropriate training and experience sharing practices on the application of equitable pedagogical strategies like active learning methods, assessment for learning, action researches, lesson studies and classroom management were limited. These practices were not intrinsically motivating and empowering learners in the classrooms.

Moreover, the empirical research evidences and professional experiences of the researcher showed that teachers' differentiated pedagogical practices have direct relationships with enhancing students' learning engagements and outcomes. However, the contextual practices at hand didn't address the diversified needs of students with learning difficulties, gifted, visual, auditory and kinesthetic learners and multiple intelligences in the classrooms. As far as the knowledge and reading of the researcher were concerned, though methods of teaching, assessments, inclusive education and classroom management problems were examined from time to time, the impacts of differentiated instructional practices on improving learners' diverse learning styles and intelligences were not comprehensively studied in primary schools. Hence, these professional gaps need to be solved at the right time to attest quality of instructional system through identification and taking remedial actions pertaining to conceptual and practical gaps in the classrooms. Therefore, the researcher examined the effects of teachers' professional development activities on differentiated instruction, students' learning engagements and outcomes in Oromia regional state.

1.3 Objectives

The main objective of the study was to examine the effects of professional development activities on differentiated instruction, students' learning engagements and outcomes in Oromia regional state. More specifically, the study has the following objectives:

- 1.** Examine the perspectives and practices of instructional practitioners (principals, supervisors, teachers and students) regarding the needs of differentiated instruction.
- 2.** Examine conceptualization and contextualization of differentiated teaching and learning in the classrooms.
- 3.** Evaluate the status of differentiation of elements or variables like contents, process, learning outcomes, resources and learning environment to address diverse needs of learners in the classrooms.
- 4.** Identify major factors that affect differentiated instructional practices in the classrooms.
- 5.** Evaluate the relationships between differentiated pedagogical practices, students' learning engagements and outcomes.

1.4 Research Questions

The following research questions were raised and answered in the course of the study:

1. How well do educational practitioners (principals, supervisors, teachers and students) understand the requirements of differentiated instructional practices to address diverse learners' needs in the classrooms?
2. How well are differentiations of teaching and learning conceptualized and contextualized in the classrooms?
3. To what extents are the four elements (variables) like contents, process, learning outcomes (products), instructional resources and learning environment differentiated to address diverse needs of learners?
4. What are the major factors affecting the implementation of differentiated instruction in the classrooms?
5. To what extents are differentiated pedagogical practices, students' learning engagements and outcomes are correlated?

1.5. Significances of the study

Differentiated instructional practice is a welcoming approach to address the diverse learning needs of different learners in the classrooms. The study informed practitioners about the requirement of differentiating contents, process, instructional materials, learning engagements, outputs, and learning environments to address diverse needs of learners. It can also be a source of evidence for future researches.

2. RESEEEACH METHODOLOGY

2.1 Research Design

Based on practicalities of the purpose of the study and the interest of the researcher, a mixed method with concurrent triangulation design was employed. Mixed method was selected on the bases of four influential criteria. These are timing, weighting, mixing and theorizing procedures (Creswell, 2014). Accordingly, the design of objectives, basic research questions, data collection instruments, data collection procedures and analyses were took place.

2.2 Sources of Data

The data were collected from both primary and secondary sources of data to get adequate evidences about the study. Accordingly, the researchers identified three categories of primary sources of data to evaluate the effectiveness of differentiated instruction that predicts quality of instruction in primary schools. These are principals, supervisors, teachers and students. The classroom observation was carried out by using checklists. Besides, the secondary sources of data were lesson plans, student's text books, teacher's guides and other differentiated educational resources found in pedagogical centers, libraries and schools' gardens.

2.3 Sample Sizes and Sampling Techniques

The sample size of each target population was determined believing that the ideal sample size is large enough to be selected economically in terms of both time and complexity, and small enough to be manageable and specific for analysis (Creswell, 2014). The sample size for a probability sampling process depends on population size. Four key factors in sampling process were judged. These are sample size, its representatives and parameters of samples, access to get the samples and sampling strategy to be used (Cohen, Manion & Morrison, 2007). In a non-probability sampling, the central purpose of the study governs the selection of participants in that each type of sample seeks to represent itself.

The researchers selected 17 (11 public and 6 private) primary schools from by using convenience sampling technique on the bases of its appropriateness for the researcher and possibility in terms of access to get reasonable data collection activities ahead of seriousness of the problems of quality of primary schools.

Table 1 Sample frame units and samples sizes of study

SN	Professional categories	Sample frame units			Samples		
		M	F	T	M	F	T
1	PTA members	64	54	118	30	22	52
2	Principals	29	21	50	22	14	36
3	Supervisors	5	-	5	5	-	5
4	Primary schools' teachers	303	245	548	126	98	224
Total		401	320	721	183	134	317

Table 1 showed that a total of 317 respondents were selected from 721 sample frame units by using non-probability and probability sampling techniques. Thus, 52 parent-teacher-association (PTA) members and 36 principals were selected from all schools by using simple random sampling technique to provide independent chance to each respondent to be selected as samples of the study. Besides, 5 supervisors were selected by using availability sampling techniques due to their manageable size and 224 primary school teachers were selected by using stratified sampling techniques based on their sex, qualification, experiences and specialization followed by simple random sampling technique. Thus, 317 respondents (52 PTA members, 36 principals and 224 teachers) filled out questionnaires and 5 supervisors were interviewed.

2.4 Data Collection Instruments

The multiple data collecting instruments used in this study were questionnaires, interview, observations and document examination. Regarding to this, Creswell (2014)

suggested that employing multiple data collection tools assist the researcher to strengthen inadequacies and ensure triangulation.

2.5 Pilot Testing and Procedures of Data Collection

A pilot study was conducted on none sample primary school to get insights for establishing appropriate design and procedures for the main study. Pertaining to this, it is important to establish the internal consistencies such as validity and reliability of the items for meaningful data collection process of the study (Fraenkel & Wallen, 2008). Then, validity of the instruments was read, commented and checked by reviewers before undertaking a pilot study. Then, the reliability of instruments for principals, teachers and PTA were $\alpha = .845$, $.878$ & $.823$ respectively. Then, improvements were made on few items of questionnaires and final data collection was carried out.

2.6 Methods of Data Analyses

The quantitative data were coded to the level of phrases for understanding, tabulated, presented and analyzed by using descriptive and inferential statistics, and the qualitative data were narrated thematically. Thus, descriptive and inferential statistics were designed to make assumptions about the characteristics of wider population (Cohen *et al.*, 2007). Accordingly, descriptive statistics such as the mean as used to test the normal distribution of data, and standard deviation measures the spread of data about the mean value. It is useful to compare sets of data, which may have the same mean but a different range. Likewise, independent sample t-test, Pearson correlation and a one-way-ANOVA were used to examine whether/no there is statistically significant differences between/among average means of agreements of respondents.

3. RESULTS AND DISCUSSION OF THE STUDY

3.1 Background information of respondents

Table 2: Descriptive statistics of gender across respondents

	Sex	N	Mean	Std. Deviation
DI Total	Male	178	59.4251	8.8220
	Female	134	48.1927	10.6036

Table 2 showed that the mean of DI in primary schools' classrooms of males ($M=59.425$, $SD=8.822$) was slightly different from that of females ($M= 48.193$, $SD=10.604$). The independent sample t-test was performed to check whether the difference was statistically significant or not.

Table 3: Independent sample t-test result on gender differences of respondents

Variables	Sex	N	M	SD	t	df	p
DI	Male	178	59.4251	7.8220	1.506	311	.132
	Female	134	48.1927	10.6036			

Table 3 revealed that there is no significant difference between male and female participants at $(t) = 1.506$, $p < .05$. This implies that male and female participants were engaged in evaluating teachers and learners engagements in their learning tasks and outcomes in primary schools under investigation.

3.2 Differentiated instructional practices across public and private primary schools

The study was employed in selected public and private schools found in Oromia regional state.

Table 4: Descriptive statistical results across sampled primary schools

School Type	N	M	SD
Public primary schools	11	63.8915	8.9200
Private primary schools	5	78.3819	7.9161
Total	16	68.4198	8.6063

Table 4 showed that differentiated instructional practices mean of public primary schools ($M = 63.892$) was significantly lower than the mean score of private primary schools ($M=78.382$).

3.3. Educational practitioners' perception and interests of differentiated instructional practices

Table 5: Descriptive statistics of practitioners' perception and interests of DI practices across the schools

Participants	N	M	SD
PTA members	52	39.7819	11.5814
Principals	36	44.8204	9.4281
Teachers	224	50.4636	7.8984
Total	312	47.6988	8.6892

Table 5 showed that the mean score of perception of teachers on differentiated instruction practices in primary schools of teachers ($M=50.464$, $SD=7.898$) was slightly higher than that of principals ($M=44.820$, $SD=9.428$), and PTA members ($M=39.782$, $SD =11.581$). A one-way-ANOVA was performed to check whether the difference was statistically significant or not.

Table 6: A summary of one-way-ANOVA of mean differences among the three groups of respondents

Variable		Sum of Squares	df	Mean Square	F	Sig.
DI perceptions & interests	Between Groups	7036.702	2	3518.351	4.659	.000
	Within Groups	233338.563	309	755.140		
	Total	240375.265	311			

Table 6 showed that there was a statistically significant difference at the $p < .05$ level in mean scores for the three respondents [$F(2, 309) = 4.658, p = .000$].

Moreover, one of the interviewees, IP1 said that he was not clear with the differences between differentiated instruction and segregation among students. But, he thought that differentiated instruction is very crucial for learners to develop self-reliance if teachers use all available time and differentiated resources while scaffolding the learners (IP1, 20/11/2020).

The researchers witnessed from classroom observation, Ob1 carried out in grade 5 integrated science that teacher's lesson plans didn't show any differentiation on variables to learner's individual differences, teachers were attempting to assist children to learn individually, pair-wise and collectively (November 20, 2020).

Therefore, though practitioners have low perceptions and interests towards identifying differentiated instruction from active learning and segregated learning approach, they believe that it assists children learning until they reach to the zones of proximal development.

The above finding was supported by the finding which stated that the traditional beliefs of 'one-size-fits-all approach' and lack of interests on differentiated instructional practices and the time demanding nature of pedagogical practice for excessive planning and teaching (Taddess, 2021). Yet, the finding contradicted with the finding that stated teachers' self-reflection and cooperation with other colleagues play major roles in teachers' conceptual change and in enhancing teachers' efforts to deconstruct the curriculum according to students' diverse needs. Finally, respecting students' individuality leads to improvements of their knowledge and skills and motivates them to learn (Theoula and Mary, 2016).

3.4 Adaptation and contextualization of DI into classroom practices

Table 7: Differentiation of teaching and learning in mixed ability classes across the schools

Sources of Variations	N	M	SD
PTA members	52	32.541	7.009
Principals	36	30.127	7.438
Teachers	224	34.567	5.489
Total	312	33.717	6.287

Table 7 showed that there were slightly the mean differences among PTA members ($M=32.541$), principals ($M=30.127$) and teachers ($M= 34.567$) regarding differentiated teaching and learning in mixed ability classes. Thus, although it leads to structural differentiation among learners, teachers were implementing ability grouping differentiation in the classrooms while giving group projects and team discussion which was discouraging students with diverse intelligences.

Table 8: A summary of one-way-ANOVA among the means of the three groups of respondents

Variable		Sum of Squares	df	Mean Square	F	Sig.
Mixed ability groups in DI	Between Groups	3429.314	2	1714.657	2.245	.082
	Within Groups	236028.149	309	763.845		
	Total	239457.463	311			

Table 8 revealed that a one-way-ANOVA was conducted to explore whether/not the significant mean difference exists among the means of the three categories of respondents on mixed ability groups in differentiated teaching and learning in schools. Table 8 showed that there was no a statistically significant difference of opinions among categories of respondents at the $p >.05$ level in mean scores for the four groups of teachers [$F(2, 309) = 2.245, p = .082$]. These practices were not fitting to diverse needs of students with learning difficulties, gifted/able learners, visual learners, auditory learners, kinesthetic learners and multiple intelligences in the classroom settings.

From classroom observation, Ob3 carried out in grade 4 English classroom, it was witnessed that some students were raising their hands to ask and answer questions, and the majority were kept silent. This indicated that instructional contents, instructional process and resources were not differentiated (January 22, 2021).

Therefore, contextualization is essential according to the suggestions of Willis & Man (2000) who stated that differentiation is a teaching philosophy based on the premise that teachers should adapt instruction to student differences. The principle of how to differentiate instruction in mixed ability classrooms were identified (Tomlison, 2005).

3.5. Multiple approaches of elements or independent variables of differentiated instruction

Table 9: Independent variables used in differentiated instructional practices across schools

Variables	M	SD
Differentiated contents and activities	25.5540	3.047
Differentiated process	27.3134	2.128
Differentiated learning outcomes	21.8511	3.950
Differentiated learning environment	20.0023	4.568
Differentiated instructional resources	22.8860	4.544
Total	22.6045	3,648

Table 9 showed that the variables were not properly differentiated according to the diverse needs of learners. Accordingly, all variables were rated below the ideal mean value. The methods of teaching were relatively differentiated with the upper mean value of the whole respondents ($M= 27.313$), since teachers were attempting to implement active learning methods and assessment for learning in classrooms followed by instructional contents ($M=25.554$), learning outcomes ($M=21.851$), learning environment ($M=20.002$) and differentiated instructional resources ($M=22.886$) There were means differences among the four domains of differentiated instruction variables in the classrooms. To see whether the difference was statistically significant or not, a one-way ANOVA was computed.

Table 10: A summary of one-way- ANOVA result of DI variables among the three groups of respondents

Variable		Sum of Squares	df	Mean Square	F	Sig.
DI variable s	Between Groups	10638.843	3	3546.281	4.698	.003
	Within Groups	232506.461	308	754.891		
	Total	243145.304	311			

Table 10 demonstrated that a one-way-ANOVA was conducted to explore whether the significant mean difference exists among the means of the DI variables in primary schools. Table 10 showed that there was a statistically significant difference of opinions

among categories of respondents at the $p < .05$ level in mean scores for differentiated contents, process, product, learning environment and instructional resources [$F(3, 309) = 4.698, p = .003$].

Moreover, the interviewee, IP2 recommended that educational practitioners were not actively working on differentiation according to the diverse needs of learners on top of the curriculum design is universal to the grade level. He further explained that differentiation of instructional variables was considered by some teachers and students as segregation trends (IP2, 17/12/2020).

From classroom observation, Ob5 carried out in grade 7 physics classroom, and Ob7 carried out in grade 4 Afan Oromo classroom, students were doing the same activities throughout 50 minutes instruction. The maximum amount of time during the school day was not devoted to differentiated teaching and learning. The groupings of students were fixed in all schools. Almost, similar practices were took place in classroom observations, Ob6 and Ob10 in grade 6 mathematics and grade 8 biology classrooms. Thus, there were poor quantity and quality of DI resources in schools’ pedagogical centers (December, 19/2020).

The effectiveness of differentiated instruction depends on the mentioned independent variables such as contents, process, product and learning environment was discussed by Tomlinson (1999; 2014) and (Tomlinson and Imbeau, 2010).

3.6 Major factors affecting implementation of differentiated instructional practices

If the factors affecting differentiated pedagogical practices are well treated, they are important to create conducive learning environment in the classrooms. These factors are large class-size, professional supports, resources, flexible standardized time schedule, understanding/knowledge and skills, and stimulating leaning environments). Hence, the items were analyzed by using average means and independent sample t-test.

Table 11: Major factors affecting implementation of differentiated instructional practices

Variable	Group	N	Mean	SD	SEM	Test Value	t	DF	Sig. (2-tailed)	Mean D/nce
Factors affecting implementation of DI practices	Teachers	224	17.74	1.86	.87	20	-3.61	223	.000	-2.26
	Principals	36	19.50	2.14	1.77	21	-.85	35	.42	-1.50

Table 11 showed that the means rated by teachers regarding major factors affecting the implementation of differentiated pedagogical practices ($M = 17.74$) was significantly different from the test value ($M = 20$), $t(223) = -3.61$, $p < .05$. The test result indicated that the teachers rated the impacts of large class-size, professional supports, material and human resources, time (flexible standardized schedule), understanding and skills, and stimulating learning environments below the expected means. Similarly, the analysis of data showed that there was statistically significant difference between the means of principals on implementation of teachers differentiated instructional practices ($M = 19.50$) and test value ($M = 21$), $t(35) = -0.85$, $p < .05$.

In the same manner, one of the interviewees named, 'IP3' verified that,

The practices of differentiated instruction are influenced by many factors. He further stated that the perception, understanding and skills of teachers contribute to the implementation of differentiated instruction. Moreover, professional supports, enough standardized time schedule and resources are necessary to implement differentiated pedagogical practices in the classrooms. Thus, differentiated instructional practices appropriately take place in a child-friendly learning environment or classrooms (IP3, 22/2/2021).

3.7 Correlation between differentiated pedagogical practices, students' learning engagements and outcomes

Effective implementation of differentiated pedagogical practices in the classrooms is expected to improve students' learning engagements and outcomes in the classrooms. Accordingly, the impacts of differentiated instructional practices in the classrooms on diversified needs of students with learning difficulties, gifted students and other intelligences related to VAK model (Visual, auditory and kinesthetic learners) were surveyed.

Table 12 Correlation b/n differentiated pedagogical practices & students' learning engagements & outcomes

Learning styles	Correlations	Total_DI	DI_Practices	SLEO
Total-DI	Pearson correlation	1	.558	.447
	Sig. (2-tailed)	.000	.000	.000
Learning difficulties	Pearson correlation	.365	.291	.187
	Sig. (2-tailed)	.000	.000	.000
Gifted learners	Pearson correlation	.385	.128	.115
	Sig. (2-tailed)	.000	.000	.000
Visual learners	Pearson correlation	.398**	.279	.164
	Sig. (2-tailed)	.000	.000	.000
Auditory learners	Pearson correlation	.344	.272	.155

	correlation			
	Sig.(2-tailed)	.000	.000	.000
Kinaesthetic learners	Pearson	.338	.241	.129
	correlation			
	Sig.(2-tailed)	.000	.000	.000

Table 12 showed that the correlations between diverse learning styles, DI practices and SLEO were $r = .558$ and $.447$, $p > .05$ respectively. This indicated that there were statistically significant positive relationships. The correlation coefficients ranged positively from small to medium. However, the effects of differentiated instructional practices on students learning engagements and outcomes were small across the variables.

In the same manner, one of the interviewees named, 'IP2' stated that,

They were teaching all students in a large class-size (50-65). He further stated that they were using group discussion holding 5-7 members. Otherwise, it is difficult to identify the learning styles and difficulties of students in the classroom. It needs further investigation and medical diagnosis. Finally, he suggested that differentiated pedagogical practices was poorly implemented in primary schools (IP2, 22/2/2021).

The above quantitative results in tables 11 and 12, and the qualitative findings certified that there are gaps among professional development activities, differentiated instructional practices and students' learning engagements and outcomes. When equitable pedagogical tools of instruction (constructivist teaching-learning methods, assessment for learning and classroom management) are well qualified and implemented they address diversified needs of students and ensure quality of instructional process to the standards (2022a). Theoretically, there is an education policy encouragement on the implementation of differentiated instruction in Ethiopia to address diverse learning styles of students (MoE, 2020). However, assuming that it requires scheduled and standardized time, knowledge and skills, small class-size and resources, teachers have no positive perception towards differentiated instructional practices in the classrooms.

3.7. Summary of Major Findings

The findings of the study were summarized as follows;

1. Attention was not given to differentiated instruction as part of the schools' staff development efforts. Accordingly, the lesson plan of teachers didn't clearly state the need for differentiated instruction such as differentiated contents and activities, process, learning outcomes (product), instructional resources and learning environments in the classrooms.

2. The objectives of differentiated instructional practices designed to be practiced in the classrooms were not properly aligned/correlated with the learning outcomes (product) of diverse learners due to less differentiation of contents and activities, process, resources and learning environment to diverse learning styles of learners.
3. The perspectives and interests of practitioners to address the diverse needs of learners in the classrooms were not motivating and devoting them to utilize maximum time during the school days in differentiated teaching and learning.
4. Although adapting and contextualizing best differentiated pedagogical practices and connecting it to real life of learners were encouraging, DI was considered by curriculum writers and teachers as something time taking and requiring physician to differentiate students' diverse needs of learning. As a result, primary schools encourage mixed ability differentiation which leads to discouraging some learners.
5. The contents and activities, process, learning outcomes, resources and learning environments were not effectively differentiated to engage learners with challenging tasks that assist realize their prioritized needs and expectations in the classrooms. Therefore, the diverse needs of heterogeneous groups in the 21st century primary classrooms were merged and lead by the one-size-fits-all scenario or teaching to-the-middle depending on segregating students into mixed ability groups on the basis of their prior academic achievement neglecting multiple intelligences of students.
6. Differentiated instructional practices as part of teachers professional development were not given due emphases through effective utilization of collaborative, communicative, creative and critical thinking to engage learners in the classrooms. Thus, differentiated pedagogical practices under implementations were not fitting to diverse needs of students with learning difficulties, gifted, visual, auditory, kinesthetic learners and multiple intelligences in the classrooms.

4. Conclusions

Differentiated instruction is a welcoming approach of scaffolding children with diverse needs of learning until they reach to their zone of proximal development. However, the theoretical perspectives and interests of practitioners on the implementation of differentiated teaching and learning were not helpful to contextualize differentiated instruction into the classrooms. As a result, diverse groups of children with diverse learning styles were homogenously learning the same contents in the same way as if they were exactly the same through universally designed curriculum and instructional system. Therefore, the differentiated contents and activities, process, learning outcomes, instructional materials, resources and learning environment were not aligned with the diverse needs of learners in the classrooms. Thus, the executions of differentiated

pedagogical practices in the classrooms didn't engage students on the bases of their intelligences and improve their leaning outcomes. Thus, the practices were not fitting to diverse needs of students with learning difficulties, gifted, visual, auditory, kinesthetic learners and multiple intelligences' in the classrooms.

5. Recommendations

The following suggestions were made for further actions:

1. Principals and teachers should give due attention to differentiated instructional practices as part of schools' staff development activities. Accordingly, the lesson plan of teachers should clearly state the need for differentiated pedagogical activities like differentiating contents, process, learning outcomes, instructional resources, learning environment and outputs'.
2. The perspectives and interests of practitioners (teachers and students) to address the diverse needs of learners in the classrooms should be improved and motivating to devote their maximum time during the school days in differentiated teaching and learning process in the classroom settings
3. The best differentiated instructional practices should be adapted, contextualized, conceptualized and connected to real life of learners. Similarly, a mixed ability group differentiation which leads to structural differentiation on the basis of prior achievement should be improved to personalized learning of students.
4. The contents and activities, process, learning outcomes, resources, learning environments and outputs should be differentiated to engage learners with challenging tasks those assist them realize their prioritized needs and expectations in the classrooms. Therefore, the diverse needs of heterogeneous groups of learners in the 21st century primary classrooms should be addressed.
5. Teachers should design and implement differentiated instruction fitting to diverse needs of students with learning difficulties, gifted, visual, auditory, kinesthetic learners and multiple intelligences in the classrooms.
6. Differentiated instructional practices as teachers' professional development activities like lesson studies, seminars and panel discussion should be given due emphases through effective utilization of elements or variables. Thus, educational practitioners of differentiated pedagogical practices should be knowledgeable, skillful and resourceful. They should have flexible and standardized time schedule and friendly learning environments in the classrooms.

6. Competing Interest Disclaimer

I have declared that no competing interest exists. The products used for this research are commonly and predominantly use products in our area of research and country.

There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge.

7. Acknowledgments

I thank the research sites for allowing me to collect the data, and the data sources for their cooperation and commitments of provisions of genuine evidences about the study. Likewise, I thank my colleagues who supported me in providing comments and feedback on issues related to differentiated instruction in primary schools' classrooms.

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