Differentiated instruction: Is it in place?

Rahma Abdul Rahman

Abstract

Implementing differentiated instruction is a national policy and to ensure that it is implemented in schools, external supervisors carryout supervision and evaluation of classroom instruction based on this approach. Differentiated instruction (DI) is recommended to close the academic gap among learners. This quantitative cross-sectional survey is designed to find out teacher understanding and implementation of differentiated instruction, with the aim of identifying the professional development needs of teachers in this area. The descriptive statistics and t.tests conducted showed that the teachers have a statistically significant level of understanding of all the DI components but implementation of all the components was not statistically significant. This study has shown that the training teachers receive in differentiated instruction have a positive impact on their understanding and implementation of this teaching pedagogy. To enhance differentiated instruction carried out in schools, teachers need to get the right professional development training. This study has shed light on areas for teachers' development in understanding and implementation of differentiated instruction.

Keywords: Differentiated instruction, understanding, implementation, content, process, products

1. Introduction

Implementing differentiated instruction in classrooms is a national policy. The Educational Supervision and Quality Improvement Division (ESQID) ensures differentiated instruction is in place through school supervision carried out using the "Quality Indicators for Child-friendly Baraabaru schools". The definition provided of differentiated instruction (teaching and learning) in the "Child-friendly Baraabaru school" (2011) guide is:

> *"An approach to teaching and learning in which instruction is tailored to meet the needs of individual students. Strategies which provide a variety of ways for individual students to take in new information, assimilate it, and demonstrate what they have learned; varying teaching strategies, methods, process and / or student products."*

The above definition best meets the DI defined by Carol Ann Tomlinson who is one of the prominent authorities of DI (Tomlinson, 2000). Differentiated instruction is a complex method to implement and within the existing time constrains and limited resources available, it is almost impossible to deliver a well-rounded differentiated lesson to a group of thirty students in any of the subjects. Nonetheless, schools are trying to apply it and comply with the education policy. Educators have strong faith that with DI in place the academic gap among learners could be minimized and that it would provide a powerful and high quality curriculum for all students unlike when teachers teach to the middle level hoping for the best for the students who are at the two ends of the continuum: the higher achievers and lower achievers. It is strongly believed that when DI is implemented well it would cater for all students and promote equity in education as it is a more democratic, humanistic and effective teaching method to apply in mixed ability classrooms. Teachers play the key roles in classroom teaching, hence the effectiveness of teaching carried out in classrooms depends completely on the knowledge and skills of teachers.

The aim of this research is to find out teachers understanding and implementation of differentiated instruction in classrooms while identifying professional development needs of teachers in DI understanding and implementation. This study is guided by the following research questions.

1. Is there a variation in teacher understanding and implementation of differentiated instruction?

2. Is there a difference in teacher understanding and implementing of DI components according to DI training received?

Unless teachers have the required knowledge of DI and skills to implement it in classrooms, teachers may be struggling in dismay with too much to cope with and wasting time, resources and energy on a failed attempt to carryout differentiated lessons. This research would pave way to provide an effective need-based professional development programme on differentiated instruction for teachers.

2. Literature Review

Students come to school with different backgrounds and experiences. Educators use various approaches to cater for diverse learners to minimize the learning gap among them. In a general education classroom there are about 32 students of nearly the same age who have diverse learning needs. Some students in the same class could be above the grade curriculum level while others struggle to cope with even below average work. It is a right of the students to get a quality education which addresses their needs and which provides equal opportunities for all students to succeed.

There are differences in non-differentiated classrooms and differentiated classrooms. In non-differentiated classrooms students are given similar work no matter what their ability is, whereas in a differentiated classroom, students' abilities are recognized and catered for (Tomlinson, 2001). Differentiated instruction is not giving some students more work and others less work. For example, in a Math class, the teacher might ask higher ability students to do twenty problems while slow learning students do three sums. This may look like a good choice but in fact it is not. In a differentiated classroom, students who have already achieved the concept should be helped and should be guided to move forward in learning the content of the curriculum. When DI is used as a teaching approach the slow learners and advance learners may not be on the same topic during the lessons but all students will be engaged in challenging and appropriate work according to their abilities (Tomlinson, 2001).

Differentiated instruction is defined by Carol Ann Tomlinson as below:

> *"An approach to teaching and learning in which instruction is tailored to meet the needs of individual students. Strategies which provide a variety of ways for individual students to take in new information, assimilate it, and demonstrate what they have learned; varying teaching strategies, methods, process and / or student products."*

(Tomlinson, 2001, 2003, p. 263) as stated in (Subban, 2006)

The help students need in grasping the concepts and applying those could be achieved only by differentiating the learning experience of the students holistically. Simply differentiating the quantity of the work given does not address students' diverse learning abilities in mixed ability classrooms. In a differentiated classroom the teacher does not prepare separate lesson plans for students or water down the curriculum for some students but uses different strategies to address the differences in learning among students (Tomlinson, 2001). According to Tomlinson (2011) the main goal of differentiated instruction is to make the most of the learning potential of all the students.

There are many theories that support the concept behind differentiated instruction. The multiple intelligences theory of Howard Gardner (2010) describes the various intelligences and how students may vary on different intelligences while Dunn and Dunn's (2000) learning style describes catering to learners' preferences to connect with them and Vygotsky's (n.d) Zone of Proximal Difference underlines the importance of profiling learners to provide appropriately challenging activities to address the individual learner's needs. Brain research has found out several important aspects to consider including creating a learner friendly environment to provide appropriately challenging tasks for students. Thinking styles addresses the need to differentiate activities and assessment methods to match the learners' thinking styles to enhance learning.

Differentiated learning as stated by Tomlinson (2001) has six concepts. They are: process, content, student products, learner profiling, interest and learners' readiness. The differentiated instruction approach is designed to differentiate the product, process and content of the lesson based on students' readiness, profile and interest. The six cores areas above are differentiated in each lesson to address the students' needs. The supporting theories provide educators a firm understanding of why this method of teaching would be successful.

2.1 Content

In differentiating content, different materials and resources are used to provide a holistic experience of learning based on the needs of the learners. The content selected is transferrable and provides a powerful and authentic learning experience (Tomlinson, 2005).

2.2 Process

To enhance learning, teachers often carry out flexible grouping of students and provide tiered assignments. Teachers utilize learning centres focusing on the diverse learning needs of students based on the concepts and generalizations being addressed. (Tomlinson, 2005)

2.3 Product / Assessment

According to Tomlinson (2005), the product is based on the concept or issue, skills of planning taught, and skills of production taught, which means that students are required to apply all the key skills and understanding. Product is differentiated through tiered assignments, independent study and authentic projects, and through catering for the varied interest of the learners. Teachers should have a clear understanding of where students are to bring them along with the curriculum, hence assessment in the DI approach is an integral element. "Assessment is essential to effective teaching and learning and is a common theme found when researching DI" (Heritage, Kim, Vendlinski, & Herman, 2009, p. 24) as stated in (Whipple, 2012).

2.4 Lesson planning

Lessons are planned to deliver content, process and product to suit the individual student's learning profile, interest and readiness (Tomlinson, 2001)

2.5 Readiness, learning profile, interest

Readiness, interest and learning profile are three characteristics of students that guide differentiation (Tomlinson, 2001). Students' readiness means how closely students' apabilities match with the skills and understanding of a topic. Learners' interest considers how much the task or topic arouses curiosity and passion to learn in students. The learning profile describes students' preferred manner to address the assignment (Ibid, 2001).

Learning in differentiated classrooms is made effective through providing powerfully organized knowledge, students' active participation, ongoing assessments and through providing students feelings of connectedness and safety in school (National Research Council, 1990; Wiggins & McTighe, 1998) as stated in (Tomlinson, 2001).

Learners learn best when they receive new challenges. If students are always given the same level of work there will not be any improvement in their skill level (Tomlinson, 2005). However, Gardner and Vygotsky (1994; 1962) alert teachers to this because giving work beyond students' capacity will only make students bored and frustrated about learning. This is the reason assessing learner readiness should be given importance (Tomlinson, 2005).

Differentiated instruction is a well-accepted method and some of the research carried out in schools where it is implemented showed that it was successful in bringing a change in learners' performance.

A study carried out by Van Tassel-Baska, (2008) compliments differentiated instruction as a model which maximise learning potential of students. Van Tassel-Baska (2008) studied the extent to which teachers demonstrated DI and student engagement in lessons. Out of 71 grade 1 to 5 teachers, 37 teachers (the experimental group) participated in professional development focused on six aspects of differentiation. The teachers in the comparison group (34 teachers) did not take part in professional development. The lessons of teachers taking part in the experiment were observed twice a year for three years and researchers compared the classroom practices of 71 teachers in Grade 3 to 5 on measures of differentiated instruction. The result showed that teachers in the experimental group (37 teachers) in the 3-year intervention study of language arts curriculum showed a higher level of DI practice in classrooms in all behavioural categories compared to (the 37 teachers of) the non-experimental group and students in the experimental group showed more engagement in learning. This study showed that teachers who carried out effective differentiated lessons were able to better engage students in learning. This research also proved that there is a higher level of DI implementation among teachers who received professional development in DI.

3. Methodology

3.1 The design

This is a quantitative cross-sectional study carried out to find out teacher understanding and implementation of differentiated instruction. The quantitative research method is utilized because it helps to collect significant amounts of data within a short period of time and since it can be carried out at a low cost (Creswell, 2008). A survey study is chosen because the trends, attitudes and opinions of a population on an issue could be discerned by studying a sample of that population and results could be gathered in quantitative or numeric form (Phillips, 2012). A cross-sectional survey allows the researcher to collect data within a short period of time or at one point of time; hence, problems arising from staff turnover, maturing, training and experience gained within the survey period could be minimized. Most importantly, it contributes to the honesty of the participants because survey participants can be kept anonymous.

3.2 The sample

The population from which the sample was drawn includes all the teachers teaching in grades 1 – 7 in four government schools in Male'. The sample was drawn using one stage cluster sampling. One stage cluster sampling allows choosing units, not individuals (Phillips, 2012). Participation in this research was voluntary. Teachers from grades 1 – 7 were selected because local syllabuses are followed in these grades, use similar resources in teaching and since the majority of these teachers have undertaken training from the same or similar institutions. Eighty percent of the teachers responded to the survey.

3.3 Data collection and instrumentation

The survey questionnaire for this study was adopted from the teacher survey on differentiated instruction, created by Carol A. Tomlinson and Susan D. Allen (2000). Tomlinson (2000, 2001, 2003, 2006, 2010) is a well-known authority on differentiated instruction. The survey items were based on the concepts of differentiation as defined by Tomlinson. This instrument has been used in various other studies and for this study it was piloted in one of the schools to bring the necessary changes to it to establish the reliability and validity of the instrument.

The survey instrument used a Likert scale to gather responses. It had two parts; part 1 and 2 with Sections A and B. The Likert Scale shows four levels of understanding from 1 to 4: 1 as lowest and described as not important, and 4 as highest and described as very important. In between these, 2 and 3 were respectively specified as somewhat important and fairly important.

Section A had 26 items on understanding differentiated instruction, with four items on components of content, process, product and interest, and 5 items on lesson planning and assessment. In section B the same 26 items were used to check the level of teacher implementation of the components. Part 1 of the instrument was utilized to gather information on the demographics of the participants.

3.4 Data

The data collected was analysed using Statistical Package for the Social Sciences (SPSS, a software designed to analyse quantitative data) to justify the hypotheses. To answer research question 1: is there a variation in teacher understanding and implementation of differentiated instruction, the variables tested included content, product, process, lesson planning, assessment, interest and readiness. A 4-point Likert scale was used to collect the data: 1 was assigned the lowest score with the label ‘not important’, 2 was assigned the label ‘somewhat important’ while 3 was ‘fairly important’ and 4 was ‘very important’. There were 26 items so the lowest score that could be obtained was 26 and the highest possible score was 104.

4. Results

4.1 Research question 1

Research question 1 seeks the variation in teacher understanding and implementation of DI components.

4.2 Variation in teacher understanding of DI

Descriptive analysis was conducted to study the data. Figure 1 below shows the variations in teacher understanding of differentiated instruction. The frequency table shows that the scores are distributed between 63 and 96. The lowest possible score that could be obtained was 26 while the highest was 104. It can be seen that 11 teachers scored 96, which is the highest score obtained, while only one teacher got 63, which is the lowest score obtained.

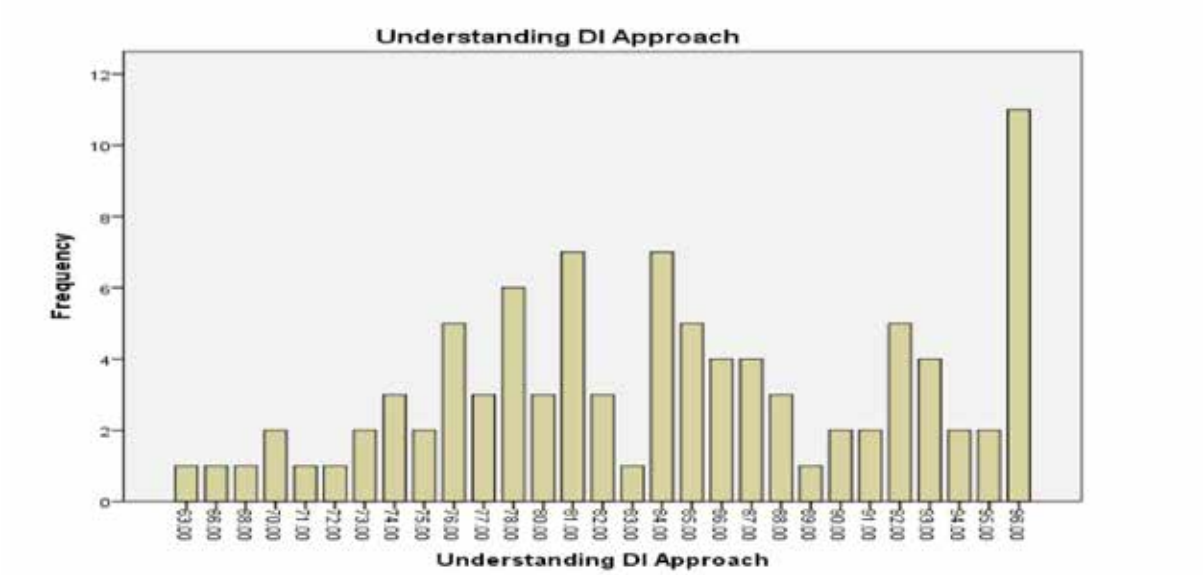

Figure 1: Frequency distribution of participants in understanding the DI Approach

Concepts	Mean	Std. Deviation	Average score per item	Score rang at 95% St.dev	Rang
Student Interest	14.1	1.8	3.5	10.5 - 17.7	9
Content	14.1	1.4	3.5	11.3 - 16.9	7
Process	13.8	1.8	3.4	10.2 - 17.4	8
Product	13.8	1.8	3.4	10.2 - 17.4	7
Lesson Planning	13.7	2.0	3.4	9.7 - 17.7	8
Assessment	14.2	1.8	2.8	10.6 - 17.8	8
Overall DI Understanding	84.0	8.1	3.2	67.8 - 100.2	33

Table 1: Descriptive statistics on understanding DI approach

When all six components of differentiated instruction are computed as a single variable and tested, the descriptive statistics generated showed a mean score of 84.03 with a standard deviation of 8.1. The standard deviation score obtained shows that 95% of the scores are distributed between 68 and 100. The lowest score that could be obtained for understanding DI was 26 and the highest score is 104. The data shows that, on average, on this four-point scale, teachers have scored 3.2 out of 4 for understanding DI components. This shows that teachers have scored 3 or higher on average for all components.

4.3 Variation in teacher implementation of DI:

Part B was used to find the variation on how the participants implement differentiated instruction in classrooms. This was also done using a 4-point Likert scale. The Likert scale obtained data on teacher implementation of DI components with regard to content, process, product, lesson planning, interest and assessment. The maximum score a teacher could obtain from the questionnaire was 104 and the lowest score was 26. The figure and tables given below show the descriptive statistics generated.

Figure 2 presents the frequency of responses. It shows that there were 10 teachers who achieved 57 (the lowest score) while highest score, 104, was attained by only one teacher. The scores were distributed between 57 and 104 on the scale.

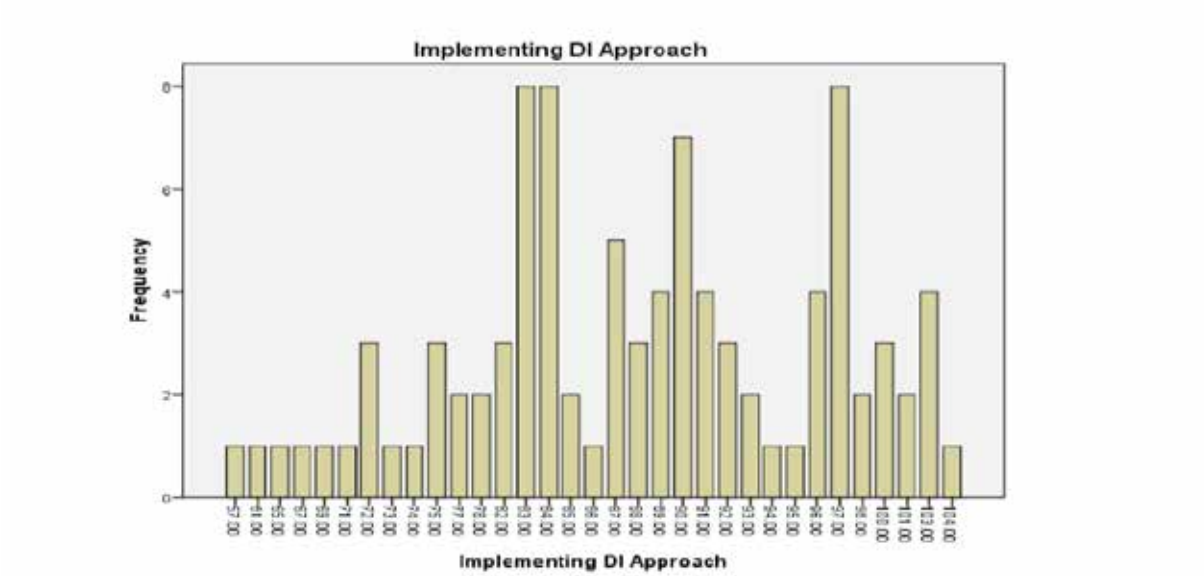

Figure 2: Frequency distribution of participants in implementing the DI approach

Concepts	Mean	Std. Deviation	Average per item	Score rang at 95%	Rang
Assessment	17.7	2.29	3.5	13.12 - 22.28	9
Product	13.6	2.00	3.4	9.6 - 17.6	8
Content	13.5	2.12	3.3	9.26 - 17.74	10
Process	13.2	2.20	3.3	11.0 - 17.6	9
Lesson Planning	16.2	2.38	3.2	11.44 - 20.8	10
Student Interest	12.9	2.01	3.2	8.88 - 16.92	9
Overall DI implementation	87.23	9.9	3.3	67.4 – 104	47

Table 2: Descriptive statistics on implementation of DI approach

When all the six components of DI were computed as a single variable and tested, the highest score attained was 104 and the lowest score was 57. The mean score was 87.23 with a standard deviation of 9.91 per component. Standard deviation showed that 95% of all scores fell between 67.4 and 104. Teachers have scored 3.3 out of 4 on average for the implementation of each component.

4.4 Research question 2

Research question 2 seeks to find out the difference in teacher understanding and implementing DI components according to the DI training received. This research question aimed to find the difference that was evident in teacher understanding of DI components (content, process, product, lesson planning, student interest and assessment) due to the DI training teachers had received. The figure below shows the type of training teachers had received.

Data for this research question was obtained from Section 2 (question number 34) of the questionnaire. Survey question number 34 identified the DI training level of teachers. The majority of the participants had learned DI concepts through a course from college and workshops, which was 77 and 49 participants respectively. Additionally, 46 teachers had learned DI concepts on their own and 28 teachers had learned DI concepts through teleconferences. Among all participants of the survey there were 63 with training and rest of the teachers,

31 have received intensive training in participants answered this question and it was found participants have attained some training in this approach. To find out the difference in teacher understanding (of product, student interest, assessment and lesson planning) according to the training they had received, t-tests were conducted. Descriptive statistics, mean rank and the Kruskal Wallis test were utilized.

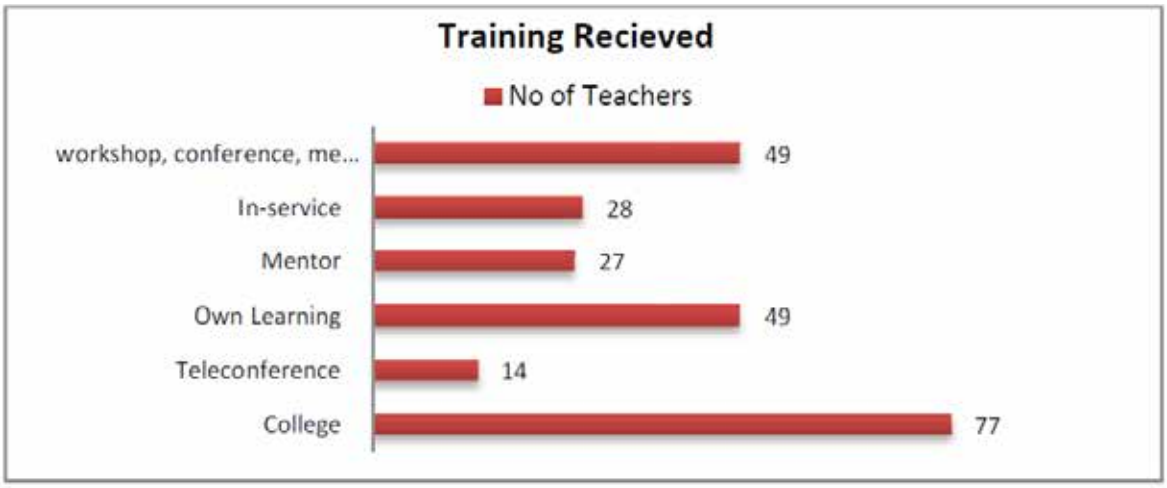

Table 2: Descriptive statistics on implementation of DI approach

4.4.1 Teacher understanding of DI according to training

The descriptive statistics conducted showed mean, standard deviation, minimum and highest scores attained. Assessment, student interest and content showed a mean score of 14 and the rest of the components, i.e., lesson planning, process and product, indicated an average score of 13. The mean ranks for extensive training remained higher when compared to teachers with some training, across all components of DI. For overall understanding of DI, the mean rank obtained for teachers with some training was 44.63 and for teachers with extensive training was 53.32. Overall understanding of the DI approach had a mean of 87.23 with a standard deviation of 9.91, while the lowest score obtained was 57 and the highest score obtained was 104. Overall, the lowest score that could be obtained was 26 and highest possible score was 104.The rank showed that overall mean score of understanding of the six components for extensive training was 53.32 and for some training was 44.63. This result showed that the teachers who had got extensive training in DI had a higher understanding of DI.

Test Statistics[a,b]							
	Understanding student	Understanding	Understanding Lesson	Understanding content	Understanding Process	Understanding Product	Understanding DI Approach
Chi-Square	.331	.817	1.230	1.240	1.598	1.956	2.115
Df	1	1	1	1	1	1	1
Asymp. Sig.	.565	.366	.267	.266	.206	.162	.146
a. Kruskal Wallis Test							
b. Grouping Variable: Diff Exp							

Table 3: Kruskal Wallis Test on understanding DI components (Some traning VS extensive training)

The Kruskal Wallis test results did not show a significant difference between groups at 0.05 level, $X^2(1, N94) = 0.146$, O 0.05. This results in retaining a null hypothesis which states that there is no significant difference among understanding DI concepts among teachers due to the training they had received. However, the mean rank scores of teachers with extensive training were higher across all six components and also when all six variables were computed as a single variable.

4.4.2 Teacher implementation of DI according to training:

The difference in teacher implementation of DI components (content, process, product, student interest, assessment and lesson planning) according to the training teachers had received was analysed using descriptive analysis and t-tests. The descriptive statistics utilized showed that assessment had the highest mean score, which was 17.7, and that student interest had the lowest mean score, at 12.9. Lesson planning had 16.2 as a mean and the rest of the components (content, process and product) had an average mean score of 13. Implementation of all six components calculated as a single variable had the following results. Overall implementation of DI approach had a mean of 87.23 with a standard deviation of 9.91; the lowest score was 57 and the highest score was 104. Overall, the lowest score possible to attain was 26 and highest possible score was 104.

Test Statistics[a,b]							
	Interest	Assessment	Lesson Planning	Content	Process	Product	DI Approach
Chi-Square	.076	1.419	7.748	5.194	4.900	3.809	5.531
Df	1	1	1	1	1	1	1
Asymp. Sig.	.783	.234	.005	.023	.027	.051	.019
a. Kruskal Wallis Test							
b. Grouping Variable: Diff Exp							

Table 4: Kruskal Wallis Test results on implementation of DI components

The Kruskal Wallis test showed a significant difference between groups with a p-value of 0.05. X^2 (1,N94) = 0.019, O0.05 was attained when implementation of the DI components were computed as a single variable and tested. Since the p-value is less than 0.05, the null hypothesis was rejected, confirming that there was a difference in the implementation of the DI components according to the training received. The rank score obtained showed that the overall mean score for implementation of the DI components of teachers with extensive training was 56.92, while teachers with some training had a mean score of 42.87. These statistics showed that teachers who have got extensive training in DI have scored higher on overall DI concepts. The effect size estimate using chi-square showed 5.94% with the chi-square value at 5.531, which means that there was a statistically significant variability in the rank scores for training.

5. Findings and Discussion

The statistical tests conducted showed that there was a high variation among teacher understanding and implementation of all the DI components: content, product, process, lesson planning, student interest and assessment.

5.1 Variation in teacher understanding and implementation of differentiated instruction

The standard deviation showed that 95% of all scores were between 67.8 and 100.2 with a range of 33, signifying a high variation in teacher understanding of differentiated instruction. Least understood components in descending order are content, student interest, process, product and assessment.

At 95% standard deviation, scores for the implementation of DI were between 67 – 107 and had a range of 47. Teachers would be able to implement DI effectively if they have a clear conceptual understanding of the concepts. The least implemented components in descending order are student interest, assessment, product, process, content and lesson planning.

5.2 Difference in teacher understanding and implementation due to training

Salvi (2013) described training as an educational process and a way for people to learn new information, acquire new skills, and relearn and enhance knowledge. Salvi states that it also allows one to take time and think about the teaching carried out and consider new ways to enhance existing practice. The Kruskal Wallis test results for teacher understanding of the DI components did not show a significant difference between groups at X^2(1, N94) = 0.146, O 0.05. This resulted in retaining the null hypothesis; there is no significant difference among teachers in understanding the DI components among teachers based on the training they had received. This could be a result of training teachers have received under various programmes and professional development activities.

The Kruskal Wallis test showed a significant difference between groups at X^2 (1,N94) = 0.019, <0.05 when implementation of DI components were computed as a single variable and tested. Since the p-value was less than 0.05, the null hypothesis was rejected confirming there was a difference in the implementation of the DI components according to the training received. The effect size estimate using chi-square showed 5.94% with the chi-square value at 5.531, which means there was a statistically significant variability in the rank scores for training. Referring to the mean score which had remained higher for extensive training in both understanding and implementation across all the components, it could be concluded that training brings a positive change in teachers' knowledge and skills.

6. Implications

The findings of this study have shown that teachers have a general understanding of all the six components of DI. However, the implementation of all the components were not at a statistically significant level. Namely, lesson planning, process and content were not implemented at a statistically significant level.

Planning lessons (p=0.005) by incorporating DI characteristics is the key and foundation of a successful lesson. Failing to prepare differentiated lesson plans could result in failure of the lessons in terms of differentiation. Differentiating content (p=0.023) and implementing it accordingly is one of the tenants of DI. If teachers fail to differentiate the contents of the lessons according to learners' profiles, readiness and interest, one of the main objectives of the DI approach will not be achieved. It means that the teachers are unable to differentiate the process (p=0.27) of the lessons because the content and process components are entwined, and the content has to be differentiated to carry out a differentiated lesson effectively, which could be attained by differentiating the process of the lesson as well.

Content differentiation requires teachers to prepare well. It includes planning and finding resources to cater for the individual needs of students in the classrooms. Some of the reasons teachers fail to implement differentiated content and process could be the insufficient time they get for planning and preparation due to their overall workload. School leaders could help teachers save time spent on lesson preparation by finding appropriate teaching resources and ensuring well-stocked libraries and resource rooms. Additionally, providing access to technology in classrooms could help teachers save teaching time to help needy students.

Teachers are required to implement content to cater for individual learning styles. To achieve this one of the suggested approaches is creating learning centres and giving the learners flexibility in choosing content. The existing situations in schools do not provide teachers the flexibility to independently choose content and cover the curriculum at a pace that is suitable to individual students. For authentic implementation of DI components (lesson planning, product and process) teachers need to have the authority to choose content and plan lessons according to the abilities and needs of the respective learners.

The DI approach encourages differentiated assessment; however, the school system currently follows a centrally informed assessment and grading policy. To implement assessment for the benefits of the students it has to have a different meaning than grading students to simply reward them or to inform parents termly. Informing parents about the students' performance is important but assessment should be carried out first with the purpose of enhancing learning. School policies for grading and awarding students' academic performance should complement differentiated instruction.

Parental pressure hinders teaching students according to their readiness levels. School managements should orient parents on these issues and create possibilities to carry out content, process and assessment as described in differentiated instruction. Some of the changes that may help teachers to implement DI effectively include minimizing the number of students in a class, implementing flexible class time-tabling, revising assessment policies and reporting systems to complement the teaching pedagogy of differentiated instruction.

This study has shown that teachers have a general understanding of DI components but fail to implement them accordingly. Apart from the constrains discussed above, one of the other reasons for teachers' failure in implementing the DI approach in classrooms could be that teachers are trying to implement all the components of DI at once. Tomlinson (2009) suggests that in implementing DI components, teachers need to move gradually by implementing one component at a time.

This study was not designed to find out the factors impeding teachers from implementing differentiated instruction in classrooms; hence, statistically it can prove none of the reasons or factors outlined above. The discussion carried out was based on the theory related to the current context of instructional practice carried out in schools. Therefore, it may help educators to reflect on current practices while working towards the improvement of differentiated instruction carried out in schools.

7. Acknowledgements:

Grateful thanks to the Institute for Research and Innovation, Villa College.

References

Anderson, T. (2008). *Theory and practice of online learning*. Edmonton: AU Press.

Appana, S. (2008). A review of benefits and limitations of online learning in the context of the student, the instructor and the tenured faculty. *International Journal on E-learning*, 7(1), 5–22.

Dunn, R. (2000). Learning styles: Theory, research, and practice. National Forum of Applied Educational Research Journal, 13 (1), 3-22.

Hafidzah Aziz. (2012). Asynchronous vs synchronous learning. *Education*. Retrieved from http://www.slideshare.net/creativemultimedia/asynchronous-vs-synchronous-learning

Hillman, D. C., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education*, 8(2), 30–42.

Gardner, H.(2010). Multiple intelligences. http://www.howardgardner.com/MI/mi.html

Kazmer, M. M., & Haythornthwaite, C. (2001). Juggling multiple social worlds distance students online and offline. *American Behavioral Scientist*, 45(3), 510–529. doi:10.1177/00027640121957196

Lee, J. (2012). Patterns of interaction and participation in a large online course: strategies for fostering sustainable discussion. *Educational Technology & Society*, 15(1), 260–272.

Tomlinson, C.A. (2000). Differentiation of Instruction in the Elementary Grades. *ERIC DIGEST*. EDO-PS-00-7

VanTassel-Baska, J. (2008). What Works in Curriculum for the Gifted Child. Keynote Address. College of William and Mary Asia Pacific Conference on the Gifted.

Vonderwell, S., & Zachariah, S. (2005). Factors that influence participation in online learning. *Journal of Research on Technology in Education*, 38(2), 213–230.

Vrasidas, C., & McIsaac, M. S. (1999). Factors influencing interaction in an online course. *American Journal of Distance Education*, 13(3), 22–36. doi:10.1080/08923649909527033

Vygotsky, L.S. (n.d). Social Development Theory (Lev Vygotsky). http://www.instructionaldesign.org/theories/social-development.html .

Wheeler, S. (2012, April 8). Learning with "e"s: Interactions of the fourth kind. Retrieved from http://steve-wheeler.blogspot.com/2012/04/interactions-of-fourth-kind.html