Differentiated Instruction: A Survey of Novice Teachers’ Understanding and Barrier to Implementation

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ABSTRACT

Gifted and talented students have different interests and preferred learning styles. Scholarly investigations have demonstrated that teaching gifted and talented students must address their needs as well as nurture their talents. Meeting the needs of gifted students in diverse classrooms has become a major problem for teachers. Differentiated instruction is one of the methods of instruction used with gifted children in programs. The idea that coping with all students equally is no longer effective, especially among gifted students. This emphasizes the importance of suitable teaching approaches, which include differentiated instruction (DI) as a fundamental solution, although challenging. Thus, this research aims to evaluate the level of understanding and the barriers faced by novice teachers in the implementation of differentiated instruction. This study was conducted at a boarding school located in Malaysia. The data were collected using a quantitative approach. The collected data were analyzed using SPSS software. The research revealed that novice teachers generally have knowledge and implement differentiated instruction during class. However, the amount of time taken for preparation becomes the major barrier to the implementation of differentiated instruction. The study also highlighted the need for professional development courses to support the implementation of differentiated instruction for gifted students.

Contribution/Originality: This paper is instrumental in assisting the Ministry of Education, administrators, as well as educators within the pre-university sector to shift their goals towards sustainable chemistry teaching to achieve success in education for sustainable development.

1. Introduction

Differentiated instruction has become an intriguing phrase in the education world due to its efficacy in meeting the needs of a wide variety of ability groups, particularly gifted and talented students. According to Tomlinson (1999), differentiated instruction relies primarily on the students understanding and engagement. Thus, in order to prepare the
students for 21st-century learning, the teachers are found to face a great challenge, especially with differentiated instruction.

According to Gaitas and Alves-Martins (2017), the primary objective of a differentiated classroom is to optimize student progress and individual achievement by adapting to students' learning requirements instead of following the conventional instructional technique of all students studying the same thing. The differentiated instructional model allows teachers to plan unique learning experiences based on the needs of each student. Teachers are able to boost their students' progress and individual achievement by educating each student at their skill level, allowing them to support them with the learning process.

Despite the fact that the teachers remarked about overcrowded classrooms, inadequate supplies, and a lack of specialized training, they still pledged to support every student and had a positive attitude toward differentiated instruction. Positive perceptions of differentiated instruction were shown by most of the teachers, and the teachers developed great initiative in implementing the instruction technique (Zerai et al., 2023).

In the study, which aims to explore the use of differentiated instruction to facilitate effective teaching and learning, it was found that the implementation of differentiated instruction helps students achieve greater academic performance. However, overcrowded classrooms, time constraints, a lack of support from stakeholders, an excessive focus on examinable topics, and a shortage of resources were among the significant difficulties faced by the teachers. It was suggested that educators and other stakeholders familiarize themselves with current theories and practices in differentiated instruction (Padmore & Ali, 2024).

1.1. Research Objectives

The purpose of this paper is to assess the levels of understanding of differentiated instruction, particularly among educators, as well as the potential obstacles that may arise when implementing differentiated instruction concepts in the classroom with gifted and talented students.

2. Literature Review

2.1. Needs of Differentiated Instruction for Gifted Students

Differentiated instruction offers concepts and approaches for various kinds of students (Marks et al., 2021). A single session meant to fulfill the requirements of all students increases the number of underperforming students in the typical classroom (Koeze, 2007). In the worst-case scenario, Anderson (2007) highlighted that when students' interest in the subject or the material supplied by the teacher is overly difficult to comprehend, they are more likely to quit the course. Thus, the concept of a one-size-fits-all curriculum has been found to be ineffective and no longer meets the needs of the majority of students (McBride, 2004).

It was discovered that gifted students have the ability to flourish in school; yet, researchers discovered that almost half of middle school gifted students are in the underachieving category (Chinnis, 2016). Furthermore, in another study attempting to reverse the underachieving behavior of gifted middle school students, Ritchotte et al. (2015) demonstrated that student behaviors became an issue for underachieving and an
interruption in the classroom. In other circumstances, gifted students feel bored due to an unchallenged school curriculum (Kanevsky & Keighley, 2003; Merriman, 2012) and are unable to accomplish tasks since they are incompatible with completing assignments as the activities seem pointless (Merriman, 2012). Thus, the teachers have a crucial responsibility to identify the learning needs of all the gifted students. Failure to recognize and address this issue results in the loss of potential and gifted students in the classroom.

Differentiated instruction is a classroom approach that has been practiced by educators for decades. Differentiated instruction is defined as a teaching approach resulting from a pedagogical shift to meet the diverse academic needs of learners, particularly gifted students, by taking the learner’s interest, readiness, and learning style into account when delivering knowledge (Koeze, 2007; Pincince, 2016). On the other hand, Roy et al. (2013) defined differentiated instruction as “an approach by which teaching is varied and adapted to match students’ abilities using systematic procedures for academic progress monitoring and data-based decision-making.” However, based on Stevenson (1992), in differentiated instruction, tasks given to the students need to fit their individual differences in talent and development in order for them to succeed in their studies.

A differentiated classroom differs from a traditional classroom in a great number of ways. In a differentiated classroom, for a given topic, more than one way is used to complete a lesson (Koeze, 2007). Usually, educators strive to differentiate instruction by providing more activities to advanced students while providing fewer activities to struggling students. It was discovered that these activities are ineffective for struggling students since they do not master the concepts. At the same time, this instruction is ineffective for advanced students because they already know more than they did before the assignment was assigned to them. Researchers express concern about the more or less approach to differentiation when educators execute differentiated instruction with a lack of clarity (Tomlinson & McTighe, 2006).

2.2 Contribution of Differentiated Instruction to Academic Performance

Differentiated instruction for gifted students in the classroom was discovered to be one of the most recent teaching and learning pedagogies in science instruction that is capable of improving students’ academic performance. In 2013, Maxey (2013) conducted a qualitative study to identify the effect of differentiated instruction on mathematics achievement. The respondents for this study were second-grade primary school students on a US military base. The findings of this demonstrate a significant difference in acquiring good grades among high, average, and low groups of students who benefited the most from differentiated instruction. The researcher also highlighted that the study was able to assist educators in determining the most effective technique for improving mathematics grades.

In addition, a comparison study using pre-test and post-test results was carried out to examine the effects of the differentiated lessons in Grade 10 Chemistry on students’ performance. Differentiated instruction and conventional teaching methods were used for the experimental and control groups, respectively. The results reveal that the implementation of differentiated instruction results in higher post-assessment scores in the experimental group compared to the control group, executed with traditional methods of teaching chemistry. Furthermore, significant improvements in conceptual knowledge and attitudes towards learning have been demonstrated that contribute to an increase in total score (Gojar & Cano, 2021).
In another study, differentiated instruction using tiered lessons and a traditional approach was utilized to investigate the performance of students in chemistry. The respondents of this study consist of 30 students from the experimental and control groups, respectively. The results of the study demonstrate that the experimental group outperformed the control group on the pre-test, post-test, and chapter test, with a significant difference between their scores. It was also found that the experimental group performed better than the control group in the different performance measures. According to the study, differentiated instruction via tiered learning is a successful strategy in the teaching and learning of chemistry (Tadifa, 2017).

Despite the numerous successes associated with differentiated instruction, several studies have highlighted challenges in implementing a differentiated instruction approach. In Malaysia, the differentiated instruction concept has not been emphasized until recently in order to introduce 21st century teaching and learning. Meanwhile, limited studies have been conducted on how differentiated learning is being conducted to cater to the needs of diverse students in the classroom, particularly in the Malaysian environment. Studies have shown that, in Malaysia, research on differentiated instruction is mainly observed with gifted and talented students (Ismail & Aziz, 2019).

In order for differentiated instructional methods to be effective and for teachers to be consistent, perceptions in terms of interest, how they learn, and level of readiness are crucial. Consideration of pupils’ interests improves their learning by introducing them to relevant topics that they enjoy. Learning becomes more manageable as students become productive and academically successful. Therefore, this study aimed to assess the teachers’ perceptions of managing differentiated instruction in their lessons by evaluating the students’ insights about differentiated instruction. Considering the significance of differentiated instruction in advancing the learning of gifted and talented students and the necessity of understanding differentiated instruction for gifted and talented students, this paper seeks to ascertain the extent of educators comprehend of differentiated instruction and potential obstacles in implementing its concepts to gifted and talented students. The research adopted a case study approach as a strategy. The findings of this study could be useful to educators seeking to use a differentiated approach in teaching and learning.

3. Research Methods

This study was conducted at a boarding school located in Malaysia. The population for this study consists of 20 educators. Simple random sampling method was used to collect the data. Recognizing the importance of differentiated instruction in teaching gifted and talented students, fourteen educators who are the educators of the boarding school were willing to participate as the respondents of the study. Remaining six educators does not implement differentiated instruction in their teaching. The participated educators were novices to differentiated instruction teaching techniques with about 3 years’ experience in the field of gifted and talented education.

3.1. Survey

The data for this study was collected using a questionnaire. The understanding of differentiated instruction and barriers to implementation provides the foundation to formulate the survey instrument. Prior to distributing the questionnaire to the respondents to the study, the survey instrument was pilot-tested, and feedback was used to improve its design. The survey questions were adapted and
modified by referring to the instrument, Teacher Self-Reflection on Differentiation for Staff Development Planning Survey (Page, 2007). The survey questions were aligned with the essential components of differentiated instruction.

The survey consists of four main sections, namely Section A: Implementation of Differentiated Instruction; Section B: Barriers to Implementing Differentiated Instruction; and Section C: Demographic Information. All the items were measured based on the level of agreement or disagreement using a 5 point Likert scale, with the following denominations: 'strongly disagree' (=1) to 'strongly agree' (=5). Prior to the data collection process, an ethical requirement was presented and the educator's consent was obtained through a signed consent form. Each respondent spent no more than twenty minutes completing the survey, and the data was collected over the course of one week. The collected survey data was analyzed using SPSS software. One limitation associated with this study is the sample size, whereby a small data set was used from the existing small number of respondents at the boarding school. Hence, the analysis consisted solely of descriptive data, without inferential statistics.

4. Results

The majority of the respondents were female (8), followed by male (6). Amongst the respondents, eight have their bachelor’s degree, four have their master’s degree and remaining two with their diploma (Table 1).

Table 1: Demographic Profiles of respondents

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<thead>
<tr>
<th>Profiles</th>
<th>Classifications</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Gender</td>
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<td>6</td>
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<tr>
<td></td>
<td>Female</td>
<td>8</td>
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<td>Qualification</td>
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4.1. Differentiated instruction changes the traditional way of teaching

Gifted and gifted students exhibit distinct traits. As a result, many gifted education scholars have constantly emphasized the effectiveness of teachers. Teachers of the gifted and talented should possess specific skills, such as the ability to recognize individuals' preferences and learning styles. Figure 1 below shows the level of implementation of differentiated instruction strategies among the teachers. It was found that ten teachers (level of agreement: agree and strongly agree) were implementing differentiated instruction strategies in their classroom, while three teachers were still neutral in their opinion. Only one teacher was found to be unfamiliar with differentiated instruction. Based on the findings, it can be concluded that the majority of teachers exhibit an adequate understanding of differentiated instruction. A good understanding leads to the implementation of differentiated instruction to meet all students’ needs at their level.
Based on Figure 2, eleven teachers (level of agreement: agree + strongly agree) use of differentiated instruction in the class would benefit gifted and talented students. Studies have demonstrated that the implementation of differentiated instruction contributed in greater academic performance for students (Tulbure, 2011), besides, increased self-confidence (McQuarrie & McRae, 2010) and maximized the students potential (Wilujeng, 2012). On the other hand, two teachers had a neutral opinion, while one teacher had the opinion that differentiated instruction does not bring any benefits to gifted and talented students. Teachers need to be exposed to more differentiated instruction training and professional development courses in order to fully understand and have a significant impact on teachers’ use of differentiation instruction.
In order to implement differentiated instructions effectively, teachers should modify the content, process, and product constantly according to students’ readiness levels (Pham, 2012). Based on the survey (Figure 3), it was found that only three teachers constantly modify contents, processes, and products in their classroom, while most of the teachers (10 teachers), have a neutral opinion. Only one teacher disagrees with modifications to the content, process, and products. The neutral responses may be a result of a lack of clear understanding of the differentiation instruction strategies of the teachers in the classroom. Based on the previous research, the teachers are required to add depth and complexity to their teaching, in order to increase the level of challenge and learning pace and provide meaningful differentiated learning experiences to the students (Rogers, 2007).

Figure 3: Differentiated instruction strategies in classroom

Figure 4 reveals the extent of the application of differentiated instruction among the teachers. Tomlinson and Allan (2000) believe that differentiated instruction occurs through four elements: content, process, product, and learning environment. For content differentiation instruction, the majority of the teachers (50%) responded agree, while only 7.1% strongly agree. In terms of process differentiation, 71.4% agree to use process differentiation. On the other hand, 14.3% of the teachers strongly agree and 14.3% of the teachers have a neutral opinion to use process differentiation. In terms of product differentiation, 42.9% strongly agree and agree, respectively. While 14.3% of the teachers with neutral opinion to use product differentiation.

The analysis shows a wide, visible difference in the application of content, process, and product during the differentiated instruction. Based on the analysis, it is clear that the majority of teachers use differentiated instruction in their classrooms. The analysis also reveals that the teachers’ pay more attention to the process and moderately to the content and product of differentiated instruction. This is inconsistent with earlier findings by Ismajli and Imami-Morina (2018), where the teachers focus more on the product and less on the content and process of differentiated learning. It is recommended to develop and apply differentiated instruction since it provides opportunities for the students by offering their best by considering their interests, abilities, and learning styles.
4.2 Barrier for Implementing Differentiated Instruction

In terms of the potential barriers, most of the novice teachers encountered various barriers in differentiating their instruction. Findings from this study revealed that the novice teachers generally understand the concept of differentiation (Figure 5), however, the majority of participants do not engage and plan based on the content, process and product differentiation.

Figure 5: Knowledge in using differentiated instruction techniques

Figure 6 shows barriers in implementing differentiated instruction among the novice teachers. Novice teachers find differentiation implementation challenging primarily due to three factors: the amount of planning time (85.7%), the shortage of time (78.6%) and engaging in routine tasks (64.3%). The highest responses show that time is a main barrier to the implementation of differentiated instruction. The result obtained is consistent with Joseph (2013), where limited time and resources were found to be the reasons for the teachers to implement differentiation. On the other hand, the large size of the class was found to be the least contributing barrier factor for the implementation of differentiation instruction. This shows that the number of students does not affect the commitment to implement differentiated instruction in teaching, but the time taken for preparation influences novice teachers. However, Hung (2015) states that a teacher needs to pay...
attention to each group and each activity in a differentiated instruction classroom. Thus, this could be very challenging for teachers if the class is large with various groups of students.

Figure 6: Barriers in implementing differentiated instruction

The other part of the reason has to do with the traditional outlook of one size fits all and professional development courses, with 28.6%, respectively. The traditional outlook of one size fits all needs to change via differentiated instruction so that no students are left behind. Naka (2017) states that during differentiated instruction, the students are taught with their own style, preference, and ability to understand the subject. Although the students are treated with different approaches, each student will learn the same learning objectives. When the teachers differentiate instructions based on the students’ preferences, they will feel motivated and engaged in the learning process (Suwastini et al., 2021). Moreover, professional development courses on differentiated instruction play an important role among novice teachers to assist in acquiring the essential tools to effectively differentiate instructions for gifted students. Research has also proven that professional development courses lead to successful implementation of educational reform (Suprayogi, 2017).

5. Conclusion

As a conclusion, this study was carried out to explore the perspective of novice teachers on differentiated instruction for gifted students. Education classrooms were never homogeneous, where various levels of students were observed. Most of the teachers have been implementing differentiated instruction; however, focus has been given to process differentiation. Generally, it can be contended that the teachers are willing to engage in differentiated instruction teaching, somehow the level of knowledge and time become major barriers to implementation. Primarily, differentiated instruction teaching intends to tailor lessons to meet individual students’ strengths, interests, and needs, besides flourishing competences with the necessary actions that lead to success. Thus, a shift to learner-centered form is highly encouraged from educator-centered instruction to deal with gifted students. However, the present study has some limitations. This research was conducted based on the perceptions of educators at one single institution. Although this limits the generalizability of the data, this research highlighted some crucial viewpoints, that are required for the successful implementation of differentiated instruction for gifted students. The findings of the study act as a guide for administrators of an institute and trainers to be more successful in organizing effective professional development courses that enhance the use of differentiated instruction for gifted students.
Ethics Approval and Consent to Participate

The researcher used the research ethics provided by the Research Ethics Committee of Universiti Kebangsaan Malaysia (RECUKM). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants according to the Declaration of Helsinki.

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Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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