Teachers' Perception on Integrating Technology In Differentiated Instruction and Collaborative Learning: A Case Study

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Abstract : The purpose of this case study is to explore the percepation of Taiwanese middle school teachers on the implementation of digital technology in order to facilitate differentiated instructions and collaborative learning, ultimately enhancing the effectiveness and equity of learning environments in diverse classrooms. The researcher performed observations and semi-structured interviews with three proficient teachers with experience utilizing technology. The results demonstrate that teachers recognize ample potential and prospects in employing digital technology to tailor teaching methods and foster an equitable and supportive learning atmosphere.

Keywords : Diferentiated intrutions; Collaborative learning, Digital technology.

INTRODUCTION

Differentiated instruction and cooperative learning have recently attracted more attention from educators and teachers because of their crucial role in creating interactive learning environments (Ismail & Al Allaq, 2019). This study aims to reported the results of observations at YC Middle School Taiwan, using cooperative learning strategies in differentiated instruction by integrating technology to create an exciting and fair learning environment and help students achievement. Cooperative learning strategies provide space for effective differentiated instruction that promotes student-centered learning and teacher facilitation. There is a need and demand for schools in various countries to meet the needs of diverse students academically and to include technology in this differentiated instructions to encourage teachers to explore students' abilities in different teaching methods in the classroom. Differentiated instructions is a pedagogical approach that helps teachers be able to adjust the level of task complexity, pace, and learning activities to students' needs, readiness, and interests (Levy, 2008; Lindner & Schwab, 2020).

Implementing differentiated instructions requires teachers to focus on their role as facilitators in the learning process in the classroom by creating a diverse learning environment. The acquisition of new skills and competencies related to involves an active, constructive, and long-term learning process in which teachers carry out professional learning activities to improve and turn the impossible into possible (Avalos, 2011; Lindner & Schwab, 2020). Differentiated instructions starts from the premise that different children have different needs, tendencies, and styles. Therefore, teachers must respond to these differences to make learning achievement more equitable. The design and simulation of different teaching and learning processes is a didactic approach that seeks to ensure educational equality in the sense of participatory justice. The teacher's didactic reactions and adaptation to individual student needs are based on the recognition of the diversity of students in the classroom community. Therefore, a methodological shift from traditional 'one size fits all' models to individualized teaching and learning in response to diversity offers a starting point for educational equity in school contexts (Bondie, et al., 2019; Lindner & Schwab, 2020).

As we knew that students can be very skilled in one area but less skilled in another. Kagan and Kagan (2009) argue that student preferences and learning readiness are likely to be closely related to different types of intelligence, for instance linguistic, mathematical, spatial, musical, bodily/kinaesthetic, naturalist, interpersonal/social, and intrapersonal/introspective. Teachers shall find it easier to meet students' needs or tendency if students differences and preferences are accommodated and met effectively so that instruction can be adapted and will be more accessible to students. With multiple intelligence theory, structured cooperative learning can be an increasingly enriching method for differentiating instruction and providing students with multiple avenues to lead. Since the various cooperative learning structures accommodate the needs of students who excel at multiple intelligences (Ismail and Al Allaq 2019; Kagan, 2009) constructing cooperative learning activities that fascinating to different student preferences has become a viable strategy for teachers, including English teachers.

Cooperative learning can bridge and facilitate differences in learners. Usually, students often feel burdened by peer pressure, competition, and self-awareness (Cassady, 2010). Therefore, differentiated instructions reveal different aspects of emotion. To minimize negative sentiments that perhaps arise in a differentiated classroom, it is necessary to apply cooperative learning because cooperative learning provides a friendly environment by facilitating differentiation and transforming it into a framework of cooperation, confidence, support, and friendliness (Ismail & Al Allaq, 2019).

One of the anticipated outcomes of cooperative learning is an increase in self-confidence and a decrease in anxiety because it rests on the principles of social interaction and promotes social and cultural awareness. In class, students can interact collaboratively, be fun, sociable, interesting, and interdependent. In other words, there is a familiarity that grows emotionally because learning places them in a context where they share ideas, results, strategies and thinking skills. As a result, stress can gradually be relieved by a comfortable and accommodating environment. Growing self-confidence will easily block anxiety and stress-related problems; praising each other in group activities has a very positive effect. Cooperative Learning is suitable with differentiated instructional strategy since it facilitates differentiation. As the Zone of Proximal Development Vygotsky and his statement that cooperative learning fosters children's intellectual development either achieve independently and collaboratively. Also, the presence of a teacher or with the collaboration and coaching of higher achieving students (Johnson & Onwuegbuzie, 2004).

On other hand, the educational environment within schools is undergoing progressive digitization, influencing the infrastructure of teaching, pedagogical methodologies, and classroom dynamics (Goodwin et al., 2015; Harper, 2018). The merits of digital technology in delivering varied instructional approaches have been acknowledged across numerous studies, spanning both national and international contexts. A favorable disposition towards digital technology has been empirically shown to enhance educators' inclusive practices, albeit necessitating their adaptation and enhancement of competencies and instructional strategies. The evolution of one-to-one technology introduces novel possibilities for diverse learning methodologies. For instance, integrating multimodality in teacher instruction, learning processes, and student assignments has demonstrated efficacy by enabling students to articulate their learning through diverse means and modes (Harper, 2018; "Kress & van Leeuwen,n.d.)

In scrutinizing 46 pertinent articles, Harper and Milman (2016) deduced that in-person digital technologies have fostered heightened collaboration, instructional variety, and differentiated instructions. One-to-one technology is commonly deployed for differentiation, particularly in interdisciplinary scenarios and as a supplementary component to the curriculum. Despite frequent reports from educators about increased student motivation and engagement resulting from digital technology implementation, some prior research indicates that such trends often surface during the implementation phase and may not endure over the long term (Bebell & Kay, n.d.). Harper and Milman (2016) observed notable fluctuations in

student achievement attributed to incorporating digital technology. While unable to definitively confirm that one-to-one technology directly improves student achievement, they identified a positive impact on academic success. Simultaneously, the potential and feasibility of instilling 21st-century competencies through digital technologies in the curriculum are evident, notwithstanding challenges associated with the absence of systematic processes (Nemiro, 2021)

RESEARCH METHOD

In the pursuit of investigating teachers' perceptions regarding the role of digital technology in differentiated instructions for the promotion of collaborative learning environments, this research was embedded within a broader intrinsic case study. The research design adhered to the principles of an exploratory sequential mixed methods approach (observation and iterviews), as Creswell and Guetterman (2021) outlined. The rationale for adopting this approach lies in its appropriateness for exploring contemporary phenomena through an abductive lens, as emphasized by Stake (1995) and Thomas (2021).

To address the research question, which focuses on how teachers perceive the integration of digital technology in differentiated instructions to foster collaboative learning, participants with substantial experience in utilizing digital technology in their instructional practices were purposefully selected. The data collection site was a middle school in Taiwan renowned for its extensive staff training and adept use of digital technology in pedagogy. The primary data source in this study comprised observations of learning in schools and interviews semi-structure three female teachers in different classes. However, as is typical in exploratory case studies, the interconnectedness of data throughout the study influenced the research trajectory during data collection, in line with Yin's (2018) perspective. Consequently, the data primarily emanated from self-reported individual teacher observations and interviews.

Regarding the data collection and analysis methodology, three female teachers were initially observed and taught in class using field notes and then interviewed about their experiences, competencies, attitudes, and practices in technology-rich classrooms. Semi-structured interview designs facilitated a dynamic dialogue, allowing interviewees to elaborate on their responses and introduce pertinent themes. This approach allowed interviewers to deviate from pre-established guides when necessary, ensuring comprehensive data on relevant topics. The interviews were promptly transcribed to inform the development

of subsequent observation guides. The observation data encompassed observed learning and insights gathered in the interviewees' classrooms post-individual interviews. Documentation occurred through field notes, recorded in a semi-structured observation guide, encompassing essential elements such as physical setting, participants, activities, interactions, and conversations. The latest knowledge informed this observation guide on educational technology, its applications, and pertinent documents and policy frameworks.

Extensive observational material and observer mobility between grade levels and classrooms were employed to mitigate the risk of teachers showcasing selective practices. Focus group interviews with 3rd and 5th-grade teachers concluded the observation period. Preliminary interview and observation outcomes analysis guided subsequent inquiries, enhancing validity and reliability. Drawing on literature related to critical aspects of inclusive learning environments, differentiated teaching, and digital technology in learning, abductive data analysis generated categories and codes. This analytical approach was influenced by the works of Tomlinson (Tomlinson, 2001).

RESULTS AND DISCUSSION

Cooperative learning in facilitating differentiated instruction. Adaptive software and applications employ algorithms and artificial intelligence to analyze real-time student performance, adjusting content and methods accordingly. Applying such technologies for differentiated instruction in collaborative learning is commonly observed when the teacher's attention is required elsewhere or as a brief exercise at the commencement or conclusion of a lesson. Through observation an interviews identified various reasons for integrating adaptive technology into their pedagogical repertoire, including providing personalized instruction, introducing variety, and enhancing engagement through enjoyable and motivating experiences. Additionally, interviewees noted that adaptive learning technology provides a convenient and effective means for teachers to monitor individual student performance and development, serving a formative assessment purpose. According to the observation and interview findings, all teachers significantly or extensively employ adaptive technology for differentiated instructions while acknowledging its use to some extent. Adaptive learning technology featured prominently across nearly all instructional sessions in the observed lessons. Participants stressed the supplementary role of learning materials, emphasizing their utilization of added content, variety, and reinforcement when needed rather than serving as the primary source of instruction.

The teacher opened this class very beautifully. She greeted several students by approaching them randomly. Before starting class, she asked how they were doing and simple things in daily life. 'How are you today?' What did you do this morning? Is there anything you want to share?' Of course, the aim is to bring students closer to their teachers so that the learning process can begin with a feeling of comfort, security, and a sense of closeness between teachers and students. This is a beautiful thing. Furthermore, the classroom layout has been arranged very well, in the form of circular groups consisting of small group discussions consisting of five people. This is a form of cooperative learning. When researcher asked the teacher whether he understood the students' character, she put it: I understand students' character and ability levels because I have carried out identification and testing from the start. Therefore, I provide material using various methods, starting from videos, images, and text; of course, this is done to accommodate and relate to the affordability of all student learning styles. Because of these differences, there is a tendency for students to prefer listening, seeing, reading, and speaking in learning. Apart from that, all the human senses for learning will also function optimally so that students will find it easier to understand the material.

About the material, the teacher also organizes questions from the simplest things, such as 'What do you see?' 'What do you think?' and 'What makes you curious or wondering?'. This is related to the systematic way humans respond to things, first from the simplest things: look, then think, then ask questions. This learning model encourages students to think critically from the most straightforward sequence. Another thing related to differentiated instruction is that teachers provide different texts; of course, this is related to students' different abilities because teachers already know each student's differences. This is important so that students have equal opportunities and make the class feel comfortable and safe for all students. Of course, this problem always exists in every class even though we have made a good class; for example, sometimes we find students who are shy or feel nervous, which often happens in that class. However, a teacher can handle it. When researcher asked how to deal with shy students. She said, 'we should always support him/her, teachers also do not stay in one place but instead surround and approach the students in turn.

Apart from that, the teacher remembers to appreciate all the answers given by students, providing positive feelings and a comfortable and happy classroom climate for students. Teachers also allow students to discuss and choose according to their choice, such as choosing the most preferred route or transportation when traveling. It is a form of human

freedom to choose according to their wishes, and when the teacher asks why they choose, the teacher teaches students to be responsible for their choice. Each choice has a logical argument behind it. Teachers are good at creating comfortable and safe classrooms, encouraging students to remain active in studying independently and in groups or discussions. Therefore, cooperative learning and differentiated intructions have been implemented in this class very well, and this is the right strategy for learning. Cooperative learning classes present a social context in which diverse opinions are accommodated. Friendly relationships develop among students as they mingle, discuss ideas, exchange ideas, and work together between groups. They have different styles from different genders, races, and abilities (Sadeghi, 2012) This fosters a sense of affection among students.

Apart from that, this class has accommodated three essential things in different learning. Differentiated instructions is the flexibility of content, processes, and products based on students' strengths, needs, and learning styles (Levy, 2008). The content is diverse or different in the learning process, so what is clear is that we can observe that the learning process in the classroom has reached all kinds of diversity, and in the end, the product produced is not the same. Next, the students present the results of the discussion and independent work. She said that all children must be given the same opportunities in their own way, allowing them to explore their abilities and knowledge because one of the crucial aspects of differentiated instruction is giving autonomy to students so that they are comfortable in their own way. However, all of this must remain under the direction of the teacher, who must pay attention to his students well and carefully. Another pasrticipant reported "even though I integrate technology in this learning, I still have to approach students well, monitor those who experience difficulties, this will foster a good relationship between teachers and students".

Multimodal approach. In interviews, teachers conveyed a substantial incorporation of multimodality in their instructional methods, and they observed a significant prevalence of multimodal presentations in their students' learning. While the self-reported interview outcomes corroborated the observed utilization of multimodality by students (with a higher frequency at upper-grade levels), notable distinctions emerged in how teachers employed multimodality. Specifically, it was noticeably more prevalent in grade 3 compared to grade 5 when employing multimodality for instructional purposes. Various explanations for this phenomenon were considered, such as the potential existence of more implicit or behind-the-scenes multimodal practices in grade 5 that may elude researchers' detection. Additionally, the

self-reported outcomes underscore teachers' intentions and the potential of multimodality more than its actual implementation. The timing of the observation period could also contribute to the observed differences, favoring 3rd graders or presenting challenges for 5th graders in terms of this specific aspect.

Another plausible explanation is that in lower grades, multimodal practices have become ingrained in everyday pedagogy, making teachers less consciously distinct in their use than other forms of support and instruction. Alternatively, there could be variations in teachers' adoption of multimodality across different grade levels. Regardless, the numerous instances of multimodality observed at both grade levels align with the findings of van Geel et al. (van Geel et al., 2019) and highlighting the significance of fostering inclusion through differentiated instructions. This underscores the notion that inclusion is not an isolated endeavor but a continual practice that encompasses the entire learning process, from unit planning to achievement assessment. She put it: This is a way to accommodate everything and use many ways to foster creativity among students. There are myriad modes that we can use. Nowadays, resources are very abundant, depending on whether we want to use them.

CONCLUSION

This findings show us a well-managed and engaging classroom that accommodates cooperative learning strategies in differentiated instruction and technology integration. This is especially important for teachers, researchers, academic administrators, advisors, curriculum designers, and decision-makers. Consider cooperative learning practices and differentiated instructions to improve the learning process to be more accommodating and rational and aware that technological developments must bring many benefits to classroom learning, especially as children at school are closer and more comfortable with technology. Therefore, teachers need to develop models like this professionally. Teachers are required to adopt technology and create a comfortable, safe, and fair learning environment for all students. Furthermore, it is critical to ensure that the cooperative learning environment is motivating and safe to encourage students to interact collaboratively in a multimodal manner.

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