Combined Differentiated Instruction and Blended Learning through Station Rotation

A Review of the Literature

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Introduction

In today's society, technology is inextricably intertwined within our daily lives. This obviously extends into the classroom as the use of technology accompanies students throughout their day. During the last few years, many education systems have attempted to implement technology in the classroom to enhance learning or to fill learning gaps with varying success. However, because new technologies emerge on a near daily basis, vetting useful technology from not, as well as integrating useful technology is a monumental task. Implementing technology is critical in reaching modern students and fulfilling their educational needs.

This literature review will analyze differentiated learning through the need, process, and drawbacks from implementing blended learning during a class through the means of station rotation in order to incorporate differentiation of instruction with the goal of meeting the needs of all students in the heterogeneous educational setting. This paper will draw from educational research across the globe, without excluding relevant information from countries outside of America. This paper will analyze what differentiated learning actually entails while highlighting the various methods for implementation, as well as those methods' effectiveness and feasibility. This paper will also define blended learning and methods for applying this teaching strategy in the classroom. This paper will highlight the importance of using station rotation to facilitate the implementation of both blended learning and differentiated instruction (DI), while analyzing the benefits and drawbacks of a heterogeneous classroom. Notably, this paper will concentrate on the traditional rotation model with a digital component while excluding other rotation models. The goal of this paper is to understand the effects of differentiated instruction through blended learning in a station rotation model on student outcomes.

Review of the Literature

The current literature defines the following terms as:

Blended Learning: is any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace where the student also learns at least in part in a supervised brick-and-mortar location away from home (Horn et al., 2017).

Differentiation Learning: is an approach to teaching in which teachers proactively modify curricula, teaching methods, resources, learning activities, and student products to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom (Tomlinson, 2001).

Station Rotation (SR): contains the following aspects: (a) the class must be split into groups that are data driven (b) each student must visit stations twice a week, (c) each student must spend at least 10 minutes at the station (d) while visiting a minimum of two stations in a single class period, and (e) the same teacher implements the instruction in a single classroom (Fulbeck et al., 2020).

Differentiated Learning

Differentiated learning is often highly sought after to show that educators are teaching their students from a variety of angles. However, educators must understand that differentiation means different work, not more work for the students (Cooper, 1998; VanTassel-Baska & Stambaugh, 2005). On the contrary, educators will require more time to understand and prepare proper lessons, dramatically increasing educator workloads to accomplish this task. This is especially complex as classrooms are filled with multileveled students each with their own struggles as they are encouraged to keep up and stay focused. All too often, teachers

insufficiently adapt their instructions to these differences (Smale-Jacobse et al., 2019). According to Kiley (2011), teachers accomplish equitable learning through deliberate DI activities such that students receive instruction that matches their individually tailored needs. However, in reality this is not an easy task (Deunk 2015). In order to effectively integrate differentiation into the classroom, educators must understand and appreciate the problems with implementation that cause resistance to differentiation. Such resistance typically begins with a lack of administrative support in spite of a demand for implementation (Lang, 2006), coupled with a lack of time to plan for differentiation (Hertberg-Davis & Brighton, 2004), on top of poor professional development that fails to properly develop the skill required to create differentiated instruction (Van Geel, 2019), educator concern over student accountability and declining testing scores due to inadequate training on differentiation (Voltz, 2006), all while educators struggle to manage their classrooms (Gaitas et al., 2016). Needless to say, differentiated learning is nearly impossible to implement in school and administrative environments that struggle with logistics and personnel management. This is doubly so when the suggested differentiated learning methods are themselves complex, requiring specialized training and/or technology, and new to educators.

As many educators are required to simply modify learning to meet skill levels during instruction, it becomes evident that many administrators are not capable of pinpointing effective adaptive teaching due to their own lack of experience with the actual practice of differentiation of instruction (Corno, 2008). According to many administrations, differentiation is a simple matter, and requires teachers to just incorporate small group instruction with other existing teaching strategies. Is this truly high-quality differentiation or merely checking a box? Researchers felt that more is required, noting that the key to successful differentiation may not be merely grouping students, but proactively modifying curricula for the needs of different ability groups (Deunk p. 49) in order to maximize the learning opportunity for each student in a given

classroom (Tomlinson et al., 2003). According to Kaur (2013) one way to ensure DI is to include BL in curriculum design allowing for learning to occur across a diverse set of learners.

Blended Learning

Students constantly have access to technology that could potentially supplement learning in the classroom. However, the COVID pandemic saw many children who were thrust into the digital learning environment who failed to use technology properly or were completely unmotivated. Worse yet, research indicates that nearly a year of learning was lost during the two years after the onset of the COVID pandemic (Dorn, 2021).Teachers and students alike hold a negative view of digital learning as most found the online education implementation to be subpar during the pandemic (Stuchlikova, 2021).

Incorporating any particular educational theory is notably difficult in the modern era. Across the globe in the midst of COVID-19, educators rapidly adopted distance learning to maintain continuity in learning(Schleicher, 2020). Internet and communication technology, such as phones, tablets, laptops coupled with a variety of edTech learning apps that come at no or minimal cost (Ramavath et al., 2020). The technology allows for a variety of learning possibilities in the classroom. However, the issue is implementation, because many people believe that use of digital learning in general accomplishes BL. This may be due to the fact that many consider merely adding computers in a classroom creates BL or the fact that educators often refer to any edTech software as BL (Horn et al., 2017). During complete online education, students reported that a lack of personnel to help them acted as a barrier to their e-learning(Abuhammad, 2020). The aspect of a teacher facilitating the learning is a required component of BL, the technology cannot be a babysitter. The overall goal is to allow students to experience the possibility to be both independent and autonomous in their learning, giving them the opportunity to study at their own pace (Namyssova, 2019). The effectiveness of BL has

been proven in research that shows students enrolled in effectively managed BL courses have better outcomes when compared to traditional education or online settings (Horn et al., 2017; Smith & Hill, 2019). A lack of effective BL education may be due in part to other well cited sources having reduced BL into a simpler concept that allows for any type of learning that is a face-to-face setting coupled with an online learning element (Graham, 2006, Garrison, 2004). This leads to digital content directed by the educators, at their prescribed time, and for their content only, which is not BL as this paper has defined the education strategy. As such, many education strategies are BL in name only.

That being said, while many different proper models of BL exist, for the purpose of this review the concentration will be on only one of the four models defined by Horn et al., (2017) known as the station rotation (SR) model. In the SR model, the students rotate between learning modalities, with at least one modality requiring online learning. The SR model allows for greater flexibility because students rotate to other stations according to the teachers' desires. This includes the possibility of activities in a small group or involving the whole class, projects in groups, individual tutoring, and completing assignments (Horn et al., 2017). In the meta-analysis by Li & Wang (2022), the benefits of SR have been well documented particularly in the cognitive domain of Bloom's Taxonomy. To illustrate the possible gains, a study by Ayob et al., (2020) saw students' math scores improved significantly by upwards 21% while using the SR model.

Station Rotation

There are four types of SR model: traditional rotation model, lab rotation model, flipped classroom model, and individual rotation model (Horn et al., 2017; Ayob et al., 2020). For the purpose of this literature review, this paper will concentrate on the traditional rotation model with a digital component. This model is conducted in a classroom setting where students rotate on a fixed schedule or according to the educator's direction with at least one online learning station

and one educator-led group (Horn et al., 2017; Ayob et al. 2020). When the time is up, the teacher makes an announcement and instructs the students to rotate and go to the next activity at the next station. Rotations have been used for many years in a variety of programs; however, what makes this a proper BL environment is the involvement of online learning. Students must navigate internet and digital content as part of at least one station, while seamlessly working on directed goals between both digital and non-digital stations. Students are also not being actively led by the educator at all times, but rather must be self-directed and self-motivated to accomplish learning goals at a given station within a given time.

Advantage of Using Station Rotation to ensure Differentiated Instruction

Looking at the direct success and drawbacks of this specific SR, Govindaraj (2017) investigated 150 college students taking physics. This study showed that most students had a positive viewpoint of SR with only 11% feeling that they had insufficient time for the given task. As educators prepare for SR, the amount of time required for each activity to be successfully completed must be considered for all types of learners. According to research (Jones & Winters, 2022), educators have seen a decline in learning in heterogeneous inclusion classes with only modest gains remaining at the elementary level. However, when BL in the form of SR was incorporated at Pennsylvania's Spring City Elementary Hybrid Learning School (SCEHLS) in the fall of 2012, the students with Individualized Education Programs (IEP's) had the highest gains in the school on their Pennsylvania System of School Assessment (PSSA) cores of 29%, which is three percentage points higher than the average increase for the total school population. Overall, the school's reading scores rose 19%, math scores rose 24%, and science scores rose 27% (Powell, 2015), indicating that successful implementation will successfully capture the low-performing students. Some highlights from the SCEHLS model: students were allowed to rotate between three learning stations—individual, collaborative, and direct instruction—every 20 minutes and then changed subjects after a full set of rotations while also having some control

over their pacing when using online curriculum. This student-led portion of SR creates an opportunity for authentic learning that is vital to the successful implementation of BL, the purpose of which is creating time for filling skill gaps for each student.

Barriers to Implementing

In 2005, the National Academies members stated that the United States lagged behind in STEM compared to other countries. In the next 5 years an additional 2 trillion dollars were spent on education, yet the National Academy's members found no noticeable differences (Guglielmi et al., 2015). In America, we spend more money on education than any other country (OECD, 2011). According to the OECD, 2013), US students were still performing lower in math but in range of international students in reading and science. In other words, over these years US educators have failed to close the skill gaps for their students. Prior to COVID-19, reading and math scores had largely remained the same over the last 30 years; however, while all students suffered educational decline, impoverished or disadvantaged students suffered the largest decline post COVID-19 (U.S. department of education, 2022). Affluent families are better equipped to mentor their children, whereas socioeconomically disadvantaged children struggle to find any assistance outside of the classroom (Muthuprasad et al., 2021). This indicates that students whose needs are not met in the classroom have little, if any, recourse to find a way to fill their learning gaps.

Mechanisms are in place to find students that are in need of support (Hung, et al., 2017). While this may be wonderful at highlighting who may be at risk of not completing school, the system is not valuable when these mechanisms do not inspire educators to act on the students' individual needs. Instructional gaps are clearly evident, as students' withdrawal from class is typically seen in middle school, but can begin even earlier (Long, 2017). Many of these students come from lower income and/or struggling families and are often persons of color with high levels of

learning challenges. Once the students feel academically abandoned, they give up on education. These students each have their own subjective experiences, and while these constructs can be, but not limited to, internal manifestations, none can be dismissed as imaginary (Blanche & Durrheim, 1999). Educators' goals should include plans to help these low-performing students. However, instead students experience teachers who are unable to approach the low-performing students with professionalism, either due to inability to implement successful teaching strategies or lack of experience (Ivankova, et al., 2016).

Research shows that teachers and parents have similar negative attitudes towards a low-performing child that shows behavioral problems, and this even extends to the interactions of a low-performing with their peers (Ivankova, et al., 2016). This negative attitude engulfs their whole life. As a teacher, our perceptions and actions should create an environment that otherwise deviates from these students' daily norms. Low-performing students are typically more mobile (Winters, 2015), allowing for such students to freely exit the education system by physical or mental means. As such, their social and emotional needs are often neglected due to relationships that often become hostile when dealing with classmates or teachers (Ivankova, et al., 2016; OECD, 2016). As we look at one of the largest cities' educational systems, New York, evidence is clear that charter schools systematically push out difficult-to-educate students (Winters, 2013). In theory, this should not happen, especially in traditional schools where all students are to be accepted and accommodated as a matter of course. Yet the nation still sees a dropout rate of 15-18% (McFarland et al., 2019). This rate has largely remained static for the last 20 years (U.S. department of education, 2001).

Before solutions or strategies can be implemented, it is important to establish clear demarcations between various learners, both as groups and as individuals. To wit, there are three recognized cooperative groupings: homogeneous high, homogeneous low, and heterogeneous (Hannafin, 1988). There are also six identifiable learners: low-skill and

disengaged, low-skill and engaged, on-level and disengaged, on-level and engaged, high-skill and disengaged, and high-skill and engaged. Heterogeneous classrooms with a co-teacher, the most commonly used current inclusion system, demonstrates no statistical difference at the elementary level and a modest decline at the secondary level, most notably in English Language Arts (Jones & Winters, 2022).

Heterogeneous grouping is generally considered optimal to use in all settings. Tomlinson et al. (2003) meta-analysis report indicates that low-performing students are most successful in heterogeneous grouping, whereas medium-performing students performed better in homogenous grouping, while high-performing students were successful in either setting. While heterogeneous instruction seems to be ideal in theory, providing the most equitable learning environment for the majority of students does not simply occur without further initiatives. Gamoran (1995) stated that mixed-ability classrooms will not meet the promised needs of the classroom without differentiated teaching strategies that allows for on-skill learning. Additionally, experienced educators are very aware of the social dynamic that accompanies mixed-ability grouping among students. Educators risk encouraging environments where high-ability learners simply take over group work, leaving both medium and low-ability students bored, unengaged, unappreciated, and without motivation to participate further. Worse, should this environment remain for long, heterogeneous grouping becomes less an exercise in bringing all skill levels together, and more of a race to group with the highest ability student to avoid doing work at all.

Conclusion

It is clear that a differentiated curriculum alone cannot address disengagement and marginalization in a sustainable way. Educators must give a reason for learning through authentic learning opportunities (Monk et al., 2013) to remove obstacles of learning by using

methods of instruction that build trust and skill prior to planning lessons. Implementing a comprehensive BL plan that includes SR allows for autonomous learning that fills educational skill gaps, as shown in the above outlined SR setting. Educators must move into a role of facilitator and mentor, moving away from being the sole source of information which necessitates moving away from the traditional classroom. Understanding that the "Head won't go where the heart hasn't been" (Harapnuik, 2015), this approach requires an "I Do, You Do" that allows for the student to govern their own learning where the educator becomes a guide. Educators must understand what BL actually means and properly implement those teaching strategies in the classroom. Doing so, students that have fallen behind will have an opportunity to fill in their own learning gaps via newly created DI through the use of BL in a SR setting. For at least these reasons, further research and hands-on implementation of this paper's topics are critical.

This Review and the Field of Education

This literature review brings to the forefront the issues of today's education and the difficulty in creating a classroom that meets the needs of all the multilevel learners. Educators and scholars alike can benefit from using this literature review to conduct independent research and compare their efforts with existing literature. This literature review serves as a concentrated collection of relevant texts in order to springboard into the topics discussed.

Strengths and Weaknesses of this Body of Literature

The current research shows how classroom makeup helps and harms students in specific populations. Additionally, research clearly shows how blended learning data showed achievement success across the classroom as a whole with the lowest preforms showing gains on all levels assessed. Further, current research shows blended learning can effectively improve learner skills involving new technology if implemented properly by the instructor.

The research failed to analyze how the current technology allowed for teachers to integrate blended learning into their lessons. Teachers often struggle with implementation of DI and the literature on BL did not address methods of implementing BL for the purpose of DI assessment. The research also failed to address how to deal with students that have been pushed through the system and have emotional issues and disengagement problems. There is a general assumption in the research that lower performers will be naturally captured and assisted with changes in educational strategy.

It is now more important than ever to ensure that research is implemented to fill the learning gaps that COVID-19 created. Prior to COVID-19, reading and math scores had largely remained the same over the last 30 years; however, while all students suffered educational decline, impoverished or disadvantaged students suffered the largest decline post COVID-19 (U.S. Department of Education, 2022). Educators will be faced with students that have significant learning gaps requiring more intervention with differentiated instruction. Currently the literature available is inadequate to arm teachers with validate research to help them overcome these issues.

Focus of the Current Study

After reviewing the current literature available, the research that is needed will focus on the use of the blended learning model of station rotation and flipped classroom to construct an environment that allows for students to self-paced their learning using the support of technology. Due to the difficulties in creating content for instructional purposes, all research will be conducted using the current available technology to support each student with their learning differences. The action research that will be implemented will strive to answer the fundamental question for improving learning environments for a heterogenous class: "What are the Effects on Differentiated Instruction Through Blended Learning in a Station Rotation Model at the High School Level?"

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