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Differentiated instruction: A research basis

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With contemporary classrooms becoming increasingly diverse, educational authorities, teachers and school administrators are looking to teaching and learning strategies that cater for a variety of learning profiles. A paradigm that is gaining ground in many educational circles is differentiated instruction. This model proposes a rethinking of the structure, management and content of the classroom, inviting participants within the learning context to become engaged in the process, to the benefit of all. While the model has been accepted and set to work, there remains room for theoretical support to give it momentum. A recent, comprehensive analysis of the literature in this area examines this model, within the context of increasing academic diversity. This paper therefore seeks to synthesise the research supporting a shift to a new exemplar for modern education, and in so doing shed light on the rationale supporting differentiated instruction.

Differentiated instruction, curriculum, differentiation

INTRODUCTION

Current educational trends across the globe reflect significant changes in student populations from two or three decades ago. The inclusion of students from non-English speaking backgrounds, students with disabilities, students from diverse cultural backgrounds and students on accelerated programs, compel educators to relook at their teaching and instructional practices. The homogeneity of yesteryear has been replaced by widespread diversity, however in many contexts, teachers do not appear to have adjusted their methods to keep abreast of these trends. This paper begins with the presentation of a grounded learning theory to support the move to differentiated instruction. Following on from this, attention is focused on the factors that intensify a shift in instructional practice. Finally, the differentiated instruction model is presented as a response to addressing learner variance.

SEARCH PROCEDURE

Databases including ERIC, Proquest, Australian Education Index, British Education Index, CBCA (formerly Canadian Education Index), EdResearch Online, Education Theses Database, Education Theses Database, Expanded Education Academic (ASAP), and PsychInfo were searched for articles, books and further publications on 'differentiated instruction'. In addition, reference lists from various books, previous literature reviews and reports were perused for further references. Furthermore, brochures, information flyers and bulletins released by the Association for Supervision and Curriculum Development (ASCD), a key player in advocating a shift to differentiation, were searched for additional references. For the purposes of this paper, only research studies dealing with differentiated instruction, over the last 25 years from 1980 to 2005, were included. Articles were included in this review if they made pertinent reference to the model of differentiated instruction. Articles, which dealt with other aspects of teaching and learning, were excluded. This strategy allowed for a more intensive perusal of research in this field.

Given that the model of differentiated instruction is relatively new, attempts were made to draw as many references into the discussion. Despite efforts to ensure a comprehensive and exhaustive review of the literature relating to differentiating instruction, this analysis cannot be complete. This is a dynamic field, which is amended regularly, and contributions from across the globe keep this model fluid. The differentiated instruction model draws most attention from the United States, with key players contributing to the field through textbooks and guides. However, the strategy is gaining in popularity in many countries, including Australia.

CONTEXT AND PURPOSE OF THE STUDY

While differentiation is acknowledged to be a compelling and effectual means of restructuring the traditional classroom to include students of diverse abilities, interests and learning profiles, the philosophy is lacking in empirical validation. Currently, a great deal has been forwarded with regard to theory, with a decided gap in the literature regarding the use and effectiveness of the differentiated model in practice. The model does however draw a great deal of support, proof of which can be found in the plethora of testimonials, anecdotes and classroom examples available through a multitude of websites and publications dealing with differentiation. All reports echo promising outcomes. Still to be decided however, is whether teachers have restructured their teaching, being cognisant of this wealth of information presented on differentiation.

This study attempts to synthesise the research and the rationale underpinning the differentiated instruction model. Previous studies and investigations in this field have investigated factors including student diversity, learning styles, brain research and the multiple intelligences as dynamics propelling the shift to differentiation. While this paper draws attention to these key features, it also presents for query, the areas that may require further investigation.

CONCEPTUAL FRAMEWORK

Vygotsky's Sociocultural Theory of Learning

Several educationalists, researchers and school administrators view the social constructivist learning theory engendered by Russian psychologist, Vygotsky (1896-1934), as central to instructional enhancement, classroom change and redevelopment (Blanton, 1998; Flem, Moen, and Gudmundsdottir, 2000; Goldfarb, 2000; Kearsley, 1996; Riddle and Dabbagh, 1999; Rueda, Goldenberg, and Gallimore, 1992; Shambaugh and Magliaro, 2001; Tharp and Gallimore, 1988). Sociocultural theory, drawing on the work of Vygotsky (1962), and later Wertsch (1991), has significant implications for teaching, schooling and education (Tharp and Gallimore, 1988). This theory is based on the premise that the individual learner must be studied within a particular social and cultural context (Blanton, 1998; Flem et al., 2000; MacGillivray and Rueda, 2001; Patsula, 1999; Tharp and Gallimore, 1988). Such situatedness is necessary for the development of higher order functions, and such functions can only be acquired and cultivated following social interaction (Blanton, 1998; Riddle and Dabbagh, 1999; Rueda et al., 1992; Shambaugh and Magliaro, 2001). Social interaction is therefore fundamental to the development of cognition (Kearsley, 1996, 2005; MacGillivray and Rueda, 2001; Patsula, 1999; Riddle and Dabbagh, 1999; Scherba de Valenzuela, 2002). Furthermore, as a departure from other theories regarding cognition, Vygotsky's theory views education as an ongoing process, not a product (Riddle and Dabbagh, 1999).

The Zone of Proximal Development

Vygotsky's notion of the zone of proximal development, a central proposition of this theory, refers to a level of development attained when learners engage in social behaviour (Blanton, 1998; Kearsley, 2005; Riddle and Dabbagh, 1999; Scherba de Valenzuela, 2002). Riddle and Dabbagh

(1999) cite Vygotsky (1978) as defining the zone of proximal development as the distance between the actual development level and the level of potential development. Hence, the zone of proximal development (ZPD) links that which is known to that which is unknown (Riddle and Dabbagh, 1999). In order to develop the ZPD, learners must actively interact socially with a knowledgeable adult or capable peers (Blanton, 1998; Kearsley, 1996; Riddle and Dabbagh, 1999). A student can only progress to the ZPD, and consequently independent learning if he or she is first guided by a teacher or expert (Blanton, 1998; Kearsley, 2005; Riddle and Dabbagh, 1999; Rueda et al., 1992). Accordingly, responsive instruction acknowledges what the learner already knows, before a new skill is taught or new knowledge introduced (MacGillivray and Rueda, 2001). The learner's skill can only be extended and enriched through meaningful adult direction (Blanton, 1998; Riddle and Dabbagh, 1999; Rueda et al., 1992). The teacher's role becomes one of purposeful instruction, a mediator of activities and substantial experiences allowing the learner to attain his or her zone of proximal development (Blanton, 1998; Rueda et al., 1992). Further to this, Vygotsky perceives language and speech as tools, used by humans to mediate their social environments (Blanton, 1998; Riddle and Dabbagh, 1999).

The Implications of Vygotsky's Theory

Vygotsky's general theory of cognitive development, was used as a framework for this investigation, as it has implications for teaching and learning in contemporary times (Flem et al., 2000; Kearsley, 2005; MacGillivray and Rueda, 2001; Patsula, 1999; Shambaugh and Magliaro, 2001). The areas of social interaction, engagement between teacher and student, physical space and arrangement, meaningful instruction, scaffolding, student ability and powerful content all become elements to consider within the context of contemporary education. With its emphasis on social interaction, Vygotsky's theory sees the student-teacher relationship as collaborative, with the learning experience becoming reciprocal (Flem et al., 2000; Riddle and Dabbagh, 1999; Shambaugh and Magliaro, 2001). The instructional environment, including the physical arrangement of furniture would be so structured to promote interaction (Riddle and Dabbagh, 1999). Furthermore, the teacher would so design the lesson that instruction will extend the student to just above the student's current developmental level, building on that which the student already knows, but encouraging the student to move ahead into areas that pose greater challenge (MacGillivray and Rueda, 2001; Riddle and Dabbagh, 1999). In this regard, scaffolding would be an appropriate strategy to access the zone of proximal behaviour (Riddle and Dabbagh, 1999). The teacher would again engage student interest and modify tasks to suit ability levels (Riddle and Dabbagh, 1999). Lesson content will also be meaningful, compelling learner interest and providing a basis for the use of mediating tools like language (MacGillivray and Rueda, 2001; Patsula, 1999). Within this framework, this study investigates the use of the differentiated instruction model as a pedagogical instrument to facilitate the learning process.

A RESEARCH RATIONALE SUPPORTING THE NEED FOR A NEW EDUCATIONAL MODEL

The rationale to consider a new model is directed by several issues, including current student diversity, brain research, theories concerning learning styles and the multiple intelligences. Theories about how students learn, the content they learn and the instructional strategy used by the teacher has been the centre of a great deal of discussion in educational circles (Burton, 2000; Guild, 2001; McIlrath and Huitt, 1995). Research has proved the argument that individuals do not learn in the same way (Fischer and Rose, 2001; Green, 1999; Guild, 2001; Mulroy and Eddinger, 2003). Consequently, contemporary education has been influenced by several renowned theorists who have investigated the different methods learners use to conceptualise ideas (Brooks, 2004; Davis, Sumara, and Luce-Kapler, 2000). While strengthening the knowledge base in this field, it has assisted educators to examine instructional practices, changing curriculum and assessment

techniques (Brooks, 2004; Cohen, McLaughlin, and Talbert, 1993; Davis et al., 2000; Fischer and Rose, 2001; Green, 1999; McIlrath and Huitt, 1995; Mulroy and Eddinger, 2003).While educators understand that not all learners are the same, and that their needs are diverse, few teachers accommodate these differences in their classrooms (Gable, Hendrickson, Tonelson, and Van Acker, 2000; Guild, 2001). Uniformity, rather than attending to diversity, dominates the culture of many contemporary classrooms (Gable et al., 2000; Guild, 2001; Sizer, 1999). In commencing discussion on this issue, it is prudent to point out that every learner benefits from an engaging learning experience, every learner deserves to be treated with respect and ever learner should have an opportunity to reach his or her potential (Guild, 2001). The current education system does not adequately address these needs (Guild, 2001). Traditional methods used by teachers often focus on exposing and remedying deficits, setting up some students for a pattern of failure (Levine, 2003). The following discussion presents the rationale that renders it imperative to consider a new model.

Addressing Differences

Contemporary student populations are becoming increasingly academically diverse (Gable et al., 2000; Guild, 2001; Hall, 2002; Hess, 1999; McAdamis, 2001; McCoy and Ketterlin-Geller, 2004; Sizer, 1999; Tomlinson, 2004a; Tomlinson, Moon, and Callahan, 1998). The inclusion of students with disabilities, students with language backgrounds other than English, students with imposing emotional difficulties and a noteworthy number of gifted students, reflect this growing diversity (Mulroy and Eddinger, 2003; Tomlinson, 2001b, 2004a). Learning within the inclusive classroom is further influenced by a student's gender, culture, experiences, aptitudes, interests and particular teaching approaches (Guild, 2001; Stronge, 2004; Tomlinson, 2002, 2004b). Most children accept that in a classroom they are not all alike, that while some possess strengths in sport, others may be academically strong (Tomlinson, 2000a). While it is accepted that the common basis for them all is a need for acceptance, nurturing and respect (Tomlinson, 2004a), attending to differences, assists each student in experiencing a degree of triumph while encouraging them to be all that they can be as individuals (Fischer and Rose, 2001; Mulroy and Eddinger, 2003; Stronge, 2004; Tomlinson, 2000a). It is necessary to take into account the vast differences among students in a classroom, acknowledging each student's strengths while accommodating their limitations (Guild, 2001; Mulroy and Eddinger, 2003; Tomlinson, 2001c, 2002). Contemporary classrooms should accept and build on the basis that learners are all essentially different (Brighton, 2002; Fischer and Rose, 2001; Griggs, 1991; Guild, 2001; Tomlinson, 2002).

The Dangers of Teaching to the Middle

Teachers need to know how to respond to the burgeoning diversity of contemporary classrooms (Fischer and Rose, 2001; Flem et al., 2000; McCoy and Ketterlin-Geller, 2004; Mulroy and Eddinger, 2003; Sizer, 1999; Tomlinson, 2001b, 2004a). The use of the one-size-fits-all curriculum no longer meets the needs of the majority of learners (Forsten, Grant, and Hollas, 2002; McBride, 2004; McCoy and Ketterlin-Geller, 2004; Tomlinson, 2002; Tomlinson and Kalbfleisch, 1998). The use of single-paced lessons delivered through a singular instructional approach disregards the different learning styles and interests present in all classrooms (Fischer and Rose, 2001; Forsten et al., 2002; Guild, 2001; Tomlinson and Kalbfleisch, 1998).

In addition, addressing student differences and interest appears to enhance their motivation to learn while encouraging them to remain committed and stay positive (Stronge, 2004; Tomlinson, 2004b). Ignoring these fundamental differences may result in some students falling behind, losing motivation and failing to succeed (Tomlinson and Kalbfleisch, 1998). Students who may be advanced and motivated may become lost as the teacher strives to finish as much of the

curriculum as possible (Tomlinson and Kalbfleisch, 1998). It would further appear that students learn effectively when tasks are moderately challenging, neither too simple nor too complex (Tomlinson, 2004b).

Brain Research

Recent research into the workings of the human brain has significant implications for educators (Greenleaf, 2003; King-Friedrichs, 2001; Levine, 2003; Nunley, 2003; Scherer, 2001; Tuttle, 2000). Brain-based instruction is cognisant of the brain's natural learning system (Greenleaf, 2003). Good instruction within the classroom seeks to utilise the brain adeptly, to process, store and retrieve information (Greenleaf, 2003). Brain research suggests three broad, related concepts that necessitate a differentiated approach (Tomlinson and Kalbfleisch, 1998). First, the learning environment should be safe and non-threatening to encourage learning (Tomlinson and Kalbfleisch, 1998). Children who experience discomfort through rejection, failure, pressure and intimidation may not feel safe within the learning context (Tomlinson and Kalbfleisch, 1998). Second, students must be appropriately challenged, the learner should be comfortable enough to accept the challenge that new learning offers, the content being nether too difficult nor too easy (Tomlinson and Kalbfleisch, 1998). Third, the student must be able to make meaning of the ideas and skills through significant association (King-Friedrichs, 2001; Tomlinson and Kalbfleisch, 1998). However, this knowledge about the workings of the human brain has yet to impact on classroom practice and teacher preparation programs (Levine, 2003).

Learning Styles

New evidence emerges regularly to support the premise that not all children learn in the same way (Guild, 2001). It is apparent that an awareness of different learning styles is a significant tool to understand differences and assist with student development (Strong, Silver, and Perini, 2001). Models of education based on learning styles have equipped teachers with the ability to plan their lessons and their curriculum, bearing in mind how students learn best (Strong et al., 2001). Being able to identify a student's learning style and teach to accommodate these can assist students to achieve better results academically and improve their attitudes toward learning (Green, 1999). Identifying learning styles enables a teacher to capitalise on a student's strengths and to become familiar with concepts they may find challenging (Green, 1999). Fine (2003) reported a significant gain in the test scores of students on special education programs, after their preferred learning style was incorporated into the instruction. Students' performances were significantly better when they were instructed through learning style approaches rather than traditional teaching methods (Fine, 2003). Furthermore, the attitudes of these students toward learning improved significantly, as they felt that their individual strengths were being accommodated (Fine, 2003).

Multiple Intelligences

Gardner's theory of the multiple intelligences is a departure from the view that intelligence is a single, measurable unit (Gardner, 1999). Gardner's theory focuses on eight intelligences, while highlighting the need for problem-solving (Campbell, Campbell, and Dickinson, 1999). An instructional technique or program that is heavily reliant on one of the intelligences, minimises opportunities for students who may not possess a propensity to learn in this way (Gardner, 1999). These students, who may not achieve in the traditional way, may become lost to both the school and the community at large (Campbell et al., 1999; Gardner, 1999). The multiple intelligences are presented as tools for learning and problem solving (Campbell et al., 1999; Green, 1999). Creating opportunities for all students, by enriching the classroom through multiple techniques and assessment forms, develops students and brings out their strengths (Campbell et al., 1999; Gardner, 1999; Green, 1999).

DIFFERENTIATED INSTRUCTION: RESPONDING TO THE NEEDS OF DIFFERENT LEARNERS

Tomlinson (2005), a leading expert in this field, defines differentiated instruction as a philosophy of teaching that is based on the premise that students learn best when their teachers accommodate the differences in their readiness levels, interests and learning profiles. A chief objective of differentiated instruction is to take full advantage of every student's ability to learn (Tomlinson, 2001a, 2001c, 2004c, 2005). In addition, she points out that differentiating can be performed in a variety of ways, and if teachers are willing to use this philosophy in their classrooms, they opt for a more effective practice that responds to the needs of diverse learners (Tomlinson, 2000a, 2005). Tomlinson (2000) maintains that differentiation is not just an instructional strategy, nor is it a recipe for teaching, rather it is an innovative way of thinking about teaching and learning.

To differentiate instruction is to acknowledge various student backgrounds, readiness levels, languages, interests and learning profiles (Hall, 2002). Differentiated instruction sees the learning experience as social and collaborative, the responsibility of what happens in the classroom is first to the teacher, but also to the learner (Tomlinson, 2004c). Building on this definition, Mulroy and Eddinger (2003) add that differentiated instruction emerged within the context of increasingly diverse student populations. Within the learning environment permitted by the differentiated instruction model, teachers, support staff and professionals collaborate to create an optimal learning experience for students (Mulroy and Eddinger, 2003). Also in this environment, each student is valued for his or her unique strengths, while being offered opportunities to demonstrate skills through a variety of assessment techniques (Mulroy and Eddinger, 2003; Tomlinson, 2001a; Tomlinson and Kalbfleisch, 1998; Tuttle, 2000).

This working definition of differentiated instruction reflects Vygotsky's socio-cultural theory, the main tenet of which lies in the social, interactional relationship between teacher and student. Tomlinson (2004c) points out that the teacher is the professional in the classroom, an individual who has been suitably trained to mentor and lead his or her wards, using appropriate techniques, assisting each learner to reach his or her potential within the learning context. Teachers are legally and ethically bound to be the expert leading the child to full development (Lawrence-Brown, 2004; Tomlinson, 2004c). The learners, in responding to the teacher's prompting, seek to be independent and self-sufficient, striving for greater awareness of their skills, abilities and ideas, taking increasing responsibility for their lives and their learning (Lawrence-Brown, 2004; Tomlinson, 2004c). The relationship between student and teacher is clearly reciprocal, the responsibility for development becoming a shared endeavour (Tomlinson, 2004c). In addition, the difficulty of skills taught should be slightly in advance of the child's current level of mastery, linking with the Vygotsky's zone of proximal development.

Differentiated instruction presents an effective means to address learner variance (Tomlinson, 2000a, 2001a, 2003), avoids the pitfalls of the one-size-fits-all curriculum (McBride, 2004), incorporates current research into the workings of the human brain (Tomlinson, 2001c; Tomlinson and Kalbfleisch, 1998; Tuttle, 2000) while supporting the multiple intelligences and varying learning styles (Lawrence-Brown, 2004; Tuttle, 2000) within contemporary classrooms. It provides a crucial platform for all teachers of inclusive classrooms, to create opportunities for success for all students (Tomlinson, 2000a). The differentiated classroom balances learning needs common to all students, with more specific needs tagged to individual learners (Tomlinson, 2001a). Differentiation can liberate students from labels, offering students individual opportunities to perform at their best (Tomlinson, 2003).

Differentiation forces teachers to shift their thinking from completing the curriculum, and compels them to move closer to catering to individual student needs (Tomlinson, 1999, 2000a). It allows the teacher to focus on the same key principles for all students, however the instructional

process, the pace and rate toward understanding these concepts varies (McAdamis, 2001; Tuttle, 2000). There are provisions for every child to learn as quickly and as deeply as possible (Tuttle, 2000). Teachers opting for differentiation find that they can use time and resources flexibly and creatively, assisting to create an atmosphere of collaboration in the classroom (Tuttle, 2000). Hess (1999) reports that as an added bonus, differentiation can be an engaging experience for teachers as it involves a different kind of energy compared to direct instruction.

Engaging Students

A fundamental tenet of the differentiated model, is that teachers must engage students (Tomlinson, 2000a). Research supports the view that curricula should be designed to engage students, it should have the ability to connect to their lives and positively influence their levels of motivation (Coleman, 2001; Guild, 2001; Hall, 2002; Sizer, 1999; Strong et al., 2001). Teachers are required to know their students, their backgrounds and their cultural links (MacGillivray and Rueda, 2001). Knowing students well allows teachers to figure out their strengths, thereby helping them to move forward (MacGillivray and Rueda, 2001). Engaging students actively in the learning process and in the content allows them to see patterns developing, to see the overlap between disciplines, to see learning as a cumulative whole (Coleman, 2001).

Catering for Interest, Learning Profile, Readiness

Differentiated instruction supports the classroom as a community, accommodating differences and sameness (Bosch, 2001; Brimijoin, Marquissee, and Tomlinson, 2003; Lawrence-Brown, 2004; Tomlinson, 2003). It allows for the creation of an environment in which all students can succeed and derive benefit (Lawrence-Brown, 2004; Tomlinson, 2003). Students differ in three important ways – readiness, interests and learning profiles – in a differentiated classroom, the teacher is obliged to attend to these differences in order to maximise the learning potential of each student in that classroom (Tomlinson, 2000b, 2001a).

Student interests vary, these interest can become effective tools to support learning in the differentiated classroom (Tomlinson, 2001a). Tomlinson (2001a) sees student interests as a powerful motivator, which wise teachers could take advantage of within the differentiated classroom. Teachers should find ways to engage students, by tapping into what interests students, and by involving students in the daily running of the classroom (MacGillivray and Rueda, 2001). Activities and discussions that are built around students' concerns and their life experiences allows the curriculum to become more meaningful to students (Bosch, 2001; MacGillivray and Rueda, 2001; McBride, 2004; Tomlinson, 2000b, 2001a). Allowing for student interests within the learning community, ensures that even marginalised students find a place (Lawrence-Brown, 2004). Most students, even struggling learners, have aptitudes and passions, providing an opportunity within the classroom for them to explore and express these interests, mitigates against the sense of failure previously experienced by these students (Lawrence-Brown, 2004).

Differentiated instruction takes cognisance of student variance by allowing the teacher to plan their content and process, supporting diverse learning styles (Lawrence-Brown, 2004; Tomlinson, 2001a). Opportunities can be created to foster group learning and provide options for individual instruction or independent learning (Lawrence-Brown, 2004; Tomlinson, 2001a). Teachers who are perceptive to the learning needs of their students help learners to make productive choices about the ways in which they will learn best (Tomlinson, 2001a). It further empowers the teacher to prioritise tasks to enrich the learning experience of specific students, students on individualised education plans can be directed to tasks which involve mastering essential skills, while students on accelerated programs may be challenged through compacting tasks or independent research projects (Lawrence-Brown, 2004). Differentiated instruction makes it possible for the teacher to

include authentic instruction, using project-based learning, bringing relevant and meaningful knowledge into the classroom (Lawrence-Brown, 2004).

Readiness makes reference to the point of entry of each student (Tomlinson, 2000a), while some students are typically at their grade level, others may be performing at below the level of their peers, while still others are a year or so ahead (Tomlinson, 2001a). Readiness levels vary greatly in current contexts, by devising support and material to support all learners, differentiated instruction develops an atmosphere for success for all learners (Lawrence-Brown, 2004). Teachers should be able to discern the evolving readiness levels of students in their care and accommodate these by providing tasks that are neither too easy, nor too challenging (Tomlinson, 2001a, 2003).

RESEARCH STUDIES SUPPORTING THE USE OF DIFFERENTIATED INSTRUCTION

Several recent studies have shown positive outcomes from the use of differentiated instruction. Johnsen (2003) conducted a study using undergraduate teachers differentiating instruction to suit different ability levels. Student teachers in this context were encouraged to differentiate content and process, using learning centres, different reading materials and different strategies (Johnsen, 2003). The study revealed that the use of differentiated techniques proved to be engaging, stimulated student interest and providing a gratifying experience for the undergraduate teachers (Johnsen, 2003). While the undergraduate teachers appeared to benefit from a rewarding experience, Johnsen (2003) does point out that students with exceptional needs continued to receive individual specialist support through other services. This begs the question: will differentiation completely meet the complex needs of all heterogeneous learners in the regular classroom, if all other support services are withdrawn?

A case study of one middle school's experience with differentiated instruction by Tomlinson (1995) revealed initial teacher opposition toward modifying instruction to suit learner variance. Added to this, administrative barriers including teacher dissention about being instructed to implement differentiated strategies by district officials, impacted on the teacher's sense of self efficacy (Tomlinson, 1995). Other barriers included teachers perceiving differentiated instruction as a fad that would pass, concerns over time allocated to prepare for differentiated lesson, unease over student assessments and preparation for testing, disquiet regarding classroom management and perceived teacher insecurity over a change in their role (Tomlinson, 1995). Observations of those teachers who adopted the use of differentiated techniques demonstrated that age was not a factor determining acceptance of the new exemplar. However, the teacher's attitude towards change proved a more decisive factor, with teachers who embraced change showing a greater inclination to adopt differentiation (Tomlinson, 1995). Teachers who experienced early successes with differentiation were more likely to persist. (Tomlinson, 1995). Tomlinson (1995) concluded that there was a need to investigate teacher resistance to new models catering for academic diversity, as well as considering teachers' perception of classroom management in the light of these changes. Classroom management appears to arise as a disquieting factor when changes are implemented – this phenomenon requires greater research since proponents of the differentiated instruction model believe that classroom management issues will decrease if teachers implement the model efficiently, yet there remains disquiet about a loss of control among teachers.

In a study investigating the use of differentiated instruction on student scores on standardised tests, teachers' perceptions of their ability to meet the needs of diverse students and parents' expectation of student performance, Hodge (1997) found that students who were prepared for tests using differentiated techniques showed a gain in their mathematics scores, but there were no comparable gains in reading scores. Further, teachers' perceptions of being able to meet the needs of diverse learners in their classrooms do not appear to be influenced by the use of traditional or differentiated instructional techniques (Hodge, 1997). With literacy levels being of great concern

to education authorities, it may be worth investigating whether student gains following the use of differentiated instruction are limited to learning areas like mathematics, while areas such as literacy require more traditional methods.

Tomlinson, Moon and Callahan (1998) investigated the nature of instructional practice among middle school populations, considering the degree to which teachers respond appropriately to academic diversity, using differentiation. This study revealed that very few teachers take student interests, learning profile or cultural differences into account when they plan lessons (Tomlinson et al., 1998). It was apparent that modifications to the tasks set were unusual and limited, with few teachers opting for differentiation of any form (Tomlinson et al., 1998). Some of the teachers who used varied instructional strategies facilitated more flexible classrooms, which allowed them to accommodate student needs more appropriately (Tomlinson et al., 1998). Most teachers expressed frustration about attempting to deal with learner variance, with many choosing the one-size-fits-all approach to teaching (Tomlinson et al., 1998). The results yielded from this study bodes poorly for both struggling and advanced learners, and highlights the need to rethink the current model of schooling (Tomlinson et al., 1998). These findings suggest an urgent need for another model that deliberately focuses on assisting teachers in their attempts to cater for burgeoning student diversity.

Differentiated instruction may mirror tracking as some teachers attempt to provide for the academic diversity of contemporary classrooms. This was evident in a study by Blozowich (2001) who found that teachers used a variety of techniques but continued to prepare lessons as they would for a tracked classroom. This researcher concluded that teachers implementing differentiated instruction require continuous and consistent professional development, coupled with intensive dialogue and consultation about how these techniques are being implemented in the classroom (Blozowich, 2001). Robison (2004) calls for further research into the utilisation of differentiated instruction techniques, as teachers view the issue of increased planning time with unease. Teachers also require support structures and cooperative teamwork to assist them as they prepare lessons incorporating differentiated instruction (Robison, 2004). Both tracking and time constraints require further investigation as potential barriers to the implementation of differentiated instruction.

McAdamis (2001) reported significant improvement in the test scores of low-scoring students in the Rockwood School District (Missouri), following the use of differentiated instruction. Apart from this tangible impact of the differentiated model, teachers in this study indicated that their students were more motivated and enthusiastic about learning. This study further reflected the whole-school change which differentiated instruction necessitates – efforts included professional development, mentoring and intensive planning (McAdamis, 2001). Teachers were initially resistant to the change, however strategies like peer coaching, action research, study groups and workshops offered on-going support and feedback (McAdamis, 2001). Teachers were eventually convinced of the benefits of differentiation and were keen to try other differentiated lessons in the year following (McAdamis, 2001). It is worth pointing out that training sessions, mentoring and professional development in this study were implemented over a five year period, and required a concerted response from all stakeholders including school principals, teachers, district trainers and school authorities (McAdamis, 2001). This study confirms the need for whole-school and whole-district change – without these essential support structures and the cooperation of all participants, it is unlikely that any differentiated program will endure. Further to this, it is clear that the results of a differentiated program can only be seen over a few years, with the initial stages being utilised to overcome teacher resistance and encourage a sustained effort.

An investigation of differentiated instruction strategies utilised by teachers in a study conducted by Affholder (2003) concluded that teachers who used these strategies more intensively showed

improved individual perception and adopted greater responsibility for student growth. In addition, this study revealed that teachers employing higher levels of differentiated techniques experienced increased feelings of self-efficacy and demonstrated greater willingness to try new instructional approaches (Affholder, 2003). It would further appear that differentiated instruction was favoured by more experienced teachers who were familiar with the curriculum they taught and who had received extensive training prior to implementing these methods in the classroom (Affholder, 2003). In the light of these findings, it may be reasonable to investigate why differentiation proved more popular with experienced teachers rather than their younger counterparts.

THEORETICAL FRAMEWORK

Three intersecting principles gleaned from the literature review serve as the basis for this research and development. First, from Vygotsky's grounded learning theory, which holds that reciprocal social interaction and the collaborative relationship between teacher and student, accommodates learning in a developmental and historical sense. Second, that the learning context is a social context which encourages the development of cognitive functions and communication skills. Social interaction between the learner and a knowledgeable adult enhances the possibility of intellectual activity. The third principle, drawn from research into the workings of the human brain and recent revelations regarding the multiple intelligences and learning styles, acknowledges that the potential for learning is enlarged if learners are engaged, associate new learning with existing information and are allowed to consolidate this information in a manner suited to an individual learning style.

Progressing from this theoretical basis, this study further takes cognisance of the tenets supporting the move to differentiate instruction, including contemporary student diversity, the dangers of teaching to the middle, research into the workings of the human brain, investigations into individual learning styles and the theories of multiple intelligences. Previous studies into the use of differentiated techniques in the classroom have considered student engagement (Johnsen, 2003; McAdamis, 2001), the experiences and reactions of teachers to heterogeneous classrooms (Johnsen, 2003; Tomlinson, 1995), administrative prerequisites (Tomlinson, 1995), the impact of differentiated techniques on test scores (Hodge, 1997) and the degree to which tasks are augmented or modified for gifted and struggling learners (Tomlinson et al., 1998). Aspects that continue to require investigation include the impact of differentiated instruction on teacher efficacy, the teacher's response to adopting a new model, the differences between differentiation and tracking, the impact of teaching experience on the teacher's ability to differentiate instruction, how time and resources are utilised during differentiation and, the challenges and strengths that teachers' perceive during the implementation of differentiated techniques.

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