Education for the 21st Century: Three Components of a New Pedagogy

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Abstract: The rate of change in today’s society has led to the realization that the model of teaching and learning that evolved to meet the needs of industrial society requires considerable transformation if it is to support the educational needs of students today. The means by which education can be transformed to equip students with the skills they will need to survive in the future is the focus of much of debate and dispute in educational circles. What is clear is that educators, students and society in general will have to redefine what it is to be a student, what constitutes effective teaching and learning and what types of knowledge, skills and strategies are considered important for successful learning. This paper investigates important components of a new pedagogy which includes a more holistic understanding of the nature of intelligence and how the brain operates, the impact of rich learning environments and the importance of building on students’ existing strengths. It discusses difference and diversity as characteristics to be celebrated as they both divide learners as individuals and connect the same learners as members of a learning community and explores the role of differentiation in the context of primary classrooms.

Keywords: Pedagogy, Differentiation, Student Learning, Intelligence, Relative Strengths

Introduction

Education has traditionally been the process by which young people were prepared for the roles they would assume in adult life: in work, leisure, family and, to a certain degree in their personal relationships. The purpose of education in the third millennium will probably be no different in that respect. What is apparent, however, is that the lives that students in primary schools today will experience as adults, will be considerably different to the experiences of their grandparents and even their parents. Never before in the history of mankind has change been so rapid, so technological and so global (Atkin, 2001). Beare (2003) identified seven ‘radical differences’ that will characterize schools of the future. In particular, he envisages a new curriculum that would necessitate team searching and learning, multi-level thinking and increasingly complex questions and answers. This curriculum would integrate disciplines and areas of knowledge formerly studied in isolation from each other. It will not be age related, as curriculum has been in the past and students would be able to respond to this in terms of their own individual interests, needs and competencies.

Lepani (1995,p.1-2), also examined future trends over a decade ago and concluded that minor reforms to the existing educational system were not going to be substantial enough to guarantee success for all learners. She gathered together current educational theory relating to educating for the future and propose eight principles on which to develop a ‘mind ware industry’, that is, upon which to enhance the learning capacity of the human mind in order to cope with the increasing demands of the ‘Knowledge Era’. These included learners acquiring the skills and strategies necessary to become lifelong learners and developing the capacities to know how they learn so that they are able to identify personal preferences and individual strategies for effective learning. Additionally, she re-conceptualized the traditional role of the student, anticipating the need for students to negotiate their learning environments, make choices about their learning and determine what they need to know and when.

For educators to embrace these challenges may be both exciting and overwhelming. The education system that served perfectly well for these adults is now under constant criticism and attack. Teachers themselves are challenged, not only to try and make sense of the out-of-school world of the students, but prepare those students for increasingly rapid, technological change in every aspect of their lives, to make decisions about their own learning and to be prepared for a lifetime of learning. Teachers, of course, will be required to do this within the contexts of educational systems, which are, by nature, conservative and, unlike many other workplaces, are slow to implement the findings of research. This may include research relating to new understandings of the nature of education for the twenty first century, which is underpinned, as always, by the notion of what it is to be intelligent. This would be unfortunate as it is quite possible that research into the nature of intelligence may provide some signposts or guidelines to the means by which some of the current
educational challenges may be explored; bearing in mind that the perception teachers hold pertaining to the nature of intelligence underpins every aspect of their practice.

**Views of the Nature of Intelligence**

Traditionally, intelligence has been understood as a static, measurable capacity for learning (Woolfolk, 2004). More recent theories dispute not only that nature of intelligence, but argue that there is more than one type of intelligence. Decades ago Thurstone (1938) proposed the first multi factor approach to intelligence. He named seven ‘primary mental abilities’ that constituted intelligence, in opposition to theories such as the one developed by Spearman (Woolfolk, 2004) that placed much significance on ‘g’ - general ability – which was determined by testing. The work of Sternberg (Sternberg et al., 2000; Sternberg & Williams, 1998; Woolfolk, 2004) has also contributed greatly to understanding intelligence in educational contexts. Sternberg hypothesizes that intelligence can be demonstrated in three different ways. His theory of intelligence comprises analytical, creative and practical abilities of intelligence, all of which are able to be capable of improvement in response to learning experiences and materials.

Gardner (1983b; 1993a; 1993b; 1999a; 1999b; 2000c) developed his ideas about intelligence as a result of ‘….comprehensive, thorough and systematic review of empirical data from studies in biology, neuropsychology, developmental psychology and cultural anthropology’ (Chen, 2004 p.5). His view of intelligence can be succinctly described as ‘…biopsychological potential with an emergent, responsive and pluralistic nature’(Chen, 2004 p.5) Gardner strongly opposes standardized means of measuring intelligence, not only because of the interactive nature of the multiple intelligences, but because some intelligence domains are impossible to measure by traditional tests. Despite this, or perhaps because of it, Gardner’s MI theory has appears to have received the most attention from educators in classrooms as a tool for differentiating the curriculum (Armstrong, 1994; Berman, 1995; Davidson; Diaz-Lefebre, 2004; Ellison, 1992; Glasgow, 1999; Hine, 2002; Kezar, 2001; Kornhaber, 1999; McKenzie, 2002; Morris, 1996; Noble, 2002; Wahl, 2002; Wise, 2001). Hoerr (2004) provides some insight into why this would be so. He describes MI as having ‘two powerful lures’(Hoerr, 2004 p.1). Firstly, he asserts more children find success at school when students are offered different pathways to learning. Secondly, he stresses that “using MI transforms the role of the teacher”.

One of the ways in which the role of the teacher is transformed is the demand for teachers to be aware of research beyond that in the educational field. Studies of the brain, made possible as a result of increasingly sophisticated technology has clear implications for classroom practice (St. Julien, 2000), as it compels educators to reflect on the dynamic relationship between what is understood by intelligence and successful learning. Reese (1998) provided a neurological basis for the learning process from cognitive science research. He identified the three steps that constitute learning. A very simple explanation of these steps supports both the implementation of constructivist pedagogy and a rationale from a cognitive perspective for implementing differentiated programs of work for learners. Additionally, it provides a physical basis from which to consider the nature of intelligence, strategies for the promotion of successful learning and ‘….the neurological basis and support for some theories (including) Gardner’s theory of multiple intelligences……’ (Reese, 1998 p. 1).

However, before investigating the cognitive science interpretation of the learning process, it may be useful to briefly investigate the idea of ‘constructivist pedagogy,’ a common term open to interpretation. It can take many forms. Matthews (in Richardson, 2003) identified eighteen different forms of educational constructivism, the major differences being between models of Social Constructivism and those of Psychological Constructivism. However, at its most basic, Constructivism and Behaviorism represent the difference between learning by remembering and learning by understanding. One of the most damaging limitations of rote learning or reproductive learning (Mayer, 1996) is that, unlike learning by understanding or productive learning (Mayer, 1996) it does not lend itself to ‘transfer’. The skills and knowledge students learn in reproductive learning are not able to be transferred easily into other learning tasks or disciplines and are most frequently retained as inert knowledge as opposed to the robust knowledge that comes from productive learning, which is more readily built into existing knowledge and can be adapted to new learning situations and tasks. It is interesting to note that Constructivism is open ended, as is the neural structure of the brain (Posner, 2004).

**Cognitive Science Perspective of Learning**

The acquisition of information is the first step, which involves separating something of interest from the vast amount of sensory stimuli that is constantly present. The selected information remains in the working (short term) memory for a very short time before it is transferred in the long term memory in two stages. Firstly, it is transferred into the long term memory but does not become permanent for approx-
imately a day. Unless hindered by some type of brain injury, the information becomes permanent in the long term memory, which is extremely complex. What is interesting for educators is that different types of knowledge are treated differently. Knowledge about how to do something (procedural knowledge) is scattered into different part of the brain. Specific information (knowing that water is wet for example) is called a semantic memory and episodic memories are associated, as the name suggests, with time, place, people etcetera. Semantic memories begin as episodic memories that become generalized by experiences of the knowledge in different contexts. Only then does it become implicit knowledge available to be used on demand.

Memory retention is the second step and can be impaired by three processes, although these are not mutually exclusive. Physical decay is not of particular interest in this study, but interference and lack of retrieval clues are pertinent issues for classroom practice. Interference ’is the effect that other information has on learning or retaining new material’ (Reese, 1998 p.3) This may be proactive, where the information is not affirming what is already known and as a result the new knowledge is simply not accepted. It may also be retroactive, when new information interferes with what is already known because of the similarity of the information. The lack of specific retrieval clues may cause this interference. In an educational context, it may occur when there is no meaningful orientation or ‘memory jogging’ clues to help identify and retrieve specific information.

Memory access is third step and often the most difficult in the learning cycle. Information is categorized and stored in complex related groups or ‘schemas’. This organization permits access to information, the richer and more extensive the associations between and amongst the groups in the networks; the more easily the memories are recalled. The initial stages of learning are considered to be more difficult for two reasons: the schemas are ‘sparsely populated’, that is they do not contain extensive knowledge as yet, and the ways in which individuals organize and categorize information is unique to each learner, necessitating a ‘multi dimensional’ approach to teaching. An added complication for specialist teachers is that novices organize their schemas differently from experts, as do experts one from another. The consequences of this ‘complication’ are that teachers must then find appropriate ways to support learners who less experienced and who organize schemas differently, not just from the teachers, but also from each other.

Given that rich associations appear to be formed during the consolidation of learning, the context of learning is vital. Students need to interact with, and experience learning in situations and contexts similar to those in which the learning is to be used. This knowledge heightens the need for educators to design rich tasks in equally rich learning environments and to plan for skills and strategies to be learnt in real life contexts as much as possible. This knowledge about the learning process impacts not only on the ways in which educators might organize teaching and learning experiences to maximize learner outcomes, but also influences the ways in which the nature of ‘intelligence’ can be defined. The stress that is currently placed on ensuring that every student is able to achieve their academic potential in classrooms (Territories, S. A.2007; Ministerial Council on Education, E., Training and Youth Affairs 1999) reflects the transition from more traditional teacher role to teachers as facilitators of learning. Underpinning this transition is the recognition that students need to develop the knowledge and skills essential for success in the twenty first century: basically an improved capacity to be flexible thinkers, efficient problem solvers and to achieve improved academic success. The specific characteristics of newly developed education policies demand that students are supported in the construction of knowledge as individual learners and that the potential of intelligence is enhanced and explored by the implementation of appropriate pedagogical strategies, including the provision of a differentiated program of work for students. The development of models such as Kalantzis & Cope’s ‘Learning by Design’ (Healy, 2008) and its inclusion in a text for educators is a positive indication that these concerns are being considered as very serious issues for day to day practice. However, even in this model, student strengths and learning preferences still need to be known by the students themselves in order to for them to participate effectively and have optimum opportunities for success.

Developing Students’ Self Knowledge

One of the other ways in which the role of the teacher is ‘transformed’ (Hoerr, 2004 p.4) is reflected in the responsibilities teachers have to not only know their students well, but to provide opportunities for students to know and understand themselves as learners. One of the means by which this may be achieved is to take a closer look at one of the ‘personal intelligences’ domains which are a component of Gardner’s Multiple Intelligences Theory (Gardner, 1983a; , 1993a; , 1993b; , 1997; , 1999a; , 1999b). The personal intelligences comprise both interpersonal and intrapersonal intelligences. Interpersonal intelligence is intelligence about others. Individuals who have strengths in this area are characterized by abilities to cooperate in group tasks, be instinctively sensitive to the feelings and needs of others, have
good communication skills with a diverse group of people and naturally make distinctions between people easily. Intrapersonal intelligence is self intelligence. This intelligence is focused on developing strength in knowledge of all aspects of self. Gardner (1983a; 1993a; 1993b; 1999a; 1999b; 2000; 2000c). Despite the importance of interpersonal intelligence in the development of intrapersonal intelligence, in this instance, intrapersonal intelligence is the intelligence domain that may most easily support students in the identification of their own relative strengths and limitations as learners.

There has always existed a ‘duality’ in the nature of intrapersonal intelligence that is not found in any other intelligence domain (Gardner, 1993a). It is not enough to develop a ‘viable model of self’ (Gardner 1993a); or a ‘working model of self’; (Gardner 1999b), individuals must also be able to use this model effectively in the context of their life choices in order to be regarded as having relative strength in this intelligence domain. Gardner’s continued interest in defining and redefining intrapersonal intelligence began in 1993 (Gardner, 1993a) and continues into the most recent publication of his work in this area (Moran & Gardner, 2007). The original definition that Gardner (1983b; 1993a) devised predominantly discussed the impact of emotion on cognition.

Gardner first indicated that his thinking about the nature of intrapersonal intelligence when this definition appeared in the Forward to the tenth anniversary edition of ‘Frames of Mind’ (1993a). Neither the general discussions nor the definitions of the other intelligence domains were altered. The solitary nature of this revision indicates the importance Gardner placed upon this intelligence domain. By 1999, this ‘viable model of self’ had become a ‘working model of self’ (Gardner, 1999b) and the stress was firmly placed not only on the development of intrapersonal intelligence itself, but capacity that individuals have to use self knowledge to make suitable choices and appropriate decisions in life. He places strong, accurate intrapersonal intelligence firmly in educational contexts in his discussion of the importance of personal choices in learning. He specifically explores the role of ‘…human emotions, personality and cognition…’ and the relationship between ‘…the understanding of one’s own mind ……(and) personal responsibility for one’s own education’ (Gardner, 1999b p.51). Here, Gardner shows clearly and purposefully the importance of intrapersonal intelligence in educational contexts. It appears that all of the ‘forces’ that impact on education, there is one over which individuals have some control; the capacity to develop strong, accurate intrapersonal intelligence and the competence to use this self knowledge to interpret, moderate and construct meaning from educational experiences. This is reflected in his most recent and most explicitly detailed definition of intrapersonal intelligence:

Intrapersonal intelligence is a cognitive capacity that processes self-relevant information. It analyses and provides coherence to abilities, emotions, beliefs, aspirations, bodily sensations and self-related representations in two ways: through increasingly complex understandings of one’s self (self awareness) and through increasingly complex orchestrations of aspects of oneself within situations (executive function). Intrapersonal intelligence simplifies the vast amounts of information a person receives or generates by subjectifying it, turning “it is” information into “I want/need” or “for me” information. (Moran & Gardner, 2007 p.21).

This definition contributes significantly to the writing on intrapersonal intelligence. Gardner’s original writings have shown subtle, but distinct differences in the way he perceived intrapersonal intelligence. Although he consistently represented the two parts of intrapersonal intelligence; he had not previously indicated any particular means by which strong personal knowledge impacted on the students’ capacities to achieve increased academic success. By offering a precise definition of intrapersonal intelligence and clearly defining the relationship between the internal components of intrapersonal intelligence and the external dimensions in new terms, i.e. as the characteristics of executive function, a clearer understanding emerges of the importance of intrapersonal intelligence for students and a process by which educators may promote and assess students’ progress in this vital area.

Moran and Gardner’s (2007) summary of the means by which individuals can achieve success offers some guidelines that may prove to be very powerful in supporting educators in the complex task of facilitating the learning of diverse individuals in a classroom. These deceptively simple guidelines allow educators to focus on developing and assessing three specific areas of student competencies and behaviors that may effectively support student learning. These three areas, dubbed the ‘hill, the will and the skill’ refer to students setting their own learning goals, having the motivation to succeed in face of difficulty and having the capacity to recognize their relative learning strengths and how to use these to support their relative limitations. The role the students undertake as twenty first century learners requires them to take increasing control of, and responsibility for, their own learning. How teachers differentiate their usual classroom practices to accommodate the new roles of both teacher and learner will reflect their current understanding of the term differentiation.
Differentiating the Curriculum

The adaptations that constitute differentiation may be implemented in various ways, all of which have to potential to meet the needs of individual students and support improved student outcomes if they are developed and implemented in a manner which suits the learning preferences and capacities of the students. One approach to teaching and learning often known as differentiation focuses on the teacher making changes to standard tasks in order to offer all students a more equitable chance of learning successfully. These changes are commonly simple alterations to the length or complexity of the task or the degree of support and scaffolding that is provided to the student. Dempsey & Arthur-Kelly (2007 p.2-3) offer a definition. They state ‘differentiation refers to teacher modifications to classroom practice to meet the needs of individual students within the classroom’(2007 p.2-3). They continue by describing a wide range of strategies to support teachers in this task, as do O’Brien and White (2001). The problem with teacher determined differentiation is that what is provided in the way of differentiated tasks is based on the perceptions that teachers have of their students’ relative strengths and limitations and frequently there is no consideration of the students’ learning preferences.

Whilst students need opportunity and experience to develop intrapersonal intelligence, especially of themselves as learners, differentiation strategies that accommodate student choices have more potential for the development of strong, accurate self knowledge that do those that are teacher directed. These strategies not only allow for differentiation, they effective allow students to openly acknowledge and celebrate their diversity within their teaching and learning communities. Tomlinson (1999; 2000a; 2000b) describes planning differentiation of content from a rather different perspective. She explains it as a matter of determining the destination (the learning goals), then planning different, but suitable routes by which to help students achieve these goals. This approach is also found in the work of McGrath & Noble (1995a; 1995b; 1998; 2005) who utilize two specific typologies to effect this ‘modification’ of classroom practices. The matrix, comprising a grid of both the cognitive process of Revised Bloom’s Taxonomy (Anderson & Krathwohl, 2000) and Gardner’s Multiple Intelligences domains (Gardner, 1983a; 1993a; 1997; 1999a; 1999b) provides a planner for differentiation of both content and cognitive complexity. This planner supports teachers in their efforts to know their students as learners and accommodate them in the activities included. Once planned, learning activities can be implemented in any number of ways to suit the learner, the teaching and learning context, and in some instances, to support the development of students’ intrapersonal intelligence domains.

Conclusion

Educationists are faced with the challenge of preparing students to take their place as productive members of an increasingly complex society in which there will undoubtedly be a constant demand to learn new skills and strategies. As technology allows some of the mysteries of brain activity in the learning process to become easily understood, there are clear indications of what comprises environments and tasks that may result in effective student learning (Reece, 1998). A new, more inclusive, perception of the nature of intelligence (Gardner, 1983b; 1993a; 1993b; 1999a; 1999b; 2000c) demands the implementation of teaching and learning strategies, such as those embedded in Constructivist pedagogies, that cater for students’ diverse learning preferences and that facilitate opportunities for all students to be successful learners. In order to accomplish this, educators need to be adept at differentiation, be aware of theories of knowledge acquisition and support students in their attempts to develop accurate self knowledge as learners. The role of facilitating obliges teachers to know their students well, to accept, celebrate and plan for their diverse learning needs and to become partners in student learning. Students themselves have new responsibilities in their own learning. They are challenged to know themselves as learners, to use this information to negotiate suitable teaching and learning tasks and environments, to develop personal strategies for success and to accept increasing responsibility for their own knowledge acquisition as their capacity to develop the cognitive skills known as executive function develops and matures (Moran & Gardner, 2007). Until these new conceptions of the traditional roles of teachers and learners are investigated and invested in and the learning environments in which students interact in formal educational contexts become authentic, meaningful and rich in context, then educational endeavors will remain focused on the past.
References


**About the Author**

*Maura Sellars*

Ms. Sellars has a keen interest in facilitating learning for all students, irrespective of diversity. This is supported by firm belief that all students have the capacity to learn effectively in learning environments that are testaments to respect and tolerance. She is a PhD candidate now working in an university context following 28 years of first hand classroom experience. She has a particular interest in Gardner's intrapersonal intelligence domain and in exploring how a strong, accurate understanding of “self” can facilitate better learning outcomes for students, especially those in Primary school settings. This interest has led to a proposal for new pedagogy that prepares students for the challenges of a rapidly changing world.
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