Irish Learning Support Association

I.L.S.A.

LEARN

VOLUME 35, 2013

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Readers are invited to submit papers to be considered for inclusion in the 2014 issue of LEARN. Papers should reach the Editorial Committee, *LEARN*, ILSA, c/o Drumcondra Education Centre, Drumcondra, Dublin 9, by January 31, 2014. Papers should be relevant to some aspect of Learning Support and should not exceed 3,000 words. For information on electronic submissions please contact the administrator on our website at *www.ilsa.ie*

The Association is concerned with the education and support of children who experience difficulty in learning, whether in special or inclusive settings, and those for whom English is an additional language. Its aims include promoting co-operation between all involved in Learning Support and Resource Teaching and enhancing the quality of the service they offer, through the provision of resources, conferences, lectures and seminars. Besides the journal *LEARN*, a newsletter is published for members.

Application forms for membership of ILSA can be downloaded from our website at *www.ilsa.ie*

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Editorial

We are just around the corner from another budget. Ruairi Quinn has to make cuts of approximately €100m to the education budget. These cuts must be viewed against the backdrop of seemingly innocuous cuts in education over the past number of years.

Yet, the cumulative effect of these cuts on special education provision is far reaching. It is worth enumerating some of them here: Resource Teacher posts for travellers were abolished; changes to teacher-pupil ratios in small schools and the complete cut to EAL (English as an additional language), all combined have affected negatively the whole area of special education.

It looks very likely that in the forthcoming budget, the axe will be wielded to class size. In June of this year the National Council for Special Education (NCSE) announced that the levels of resource hours available in the system would be maintained at 2012/2013 levels. However with an increase in student numbers of 4,100, schools would need to "adjust" the time allocated to individual students to allow for the increase in student numbers.

Even more worrying is the news that the NCSE is currently developing a new allocation model for teaching supports to "ensure that all available posts are allocated to schools in line with their educational profile of need, rather than on the basis of the number of students attending, or the number of class teachers." This sounds very like departmental speak for more cutbacks to SEN! The reduction in time allocated to individual students of 25% mentioned above, was reversed shortly after being announced, and in spite of the eloquent defence of the measures by NCTE! However, the Minister declared that this reversal would have to be made up in the 2013 budget. In light of the fact that education spending has fallen as a percentage of GDP from 13.7% to 9.4%, there is no fat to cut from an already bare education carcass!

Children with resource hours have already been cut by 15%. Almost no children receive occupational therapy or speech or language therapy in school and children who require Special Needs Assistants aren't getting them.

On a brighter note, it has been a great honour for me to have been invited to serve as Editor of *Learn* for the past four years. It never ceases to amaze me the wide range and diversity of topics and themes that come across my desk each year. This year has been no different!

Each of the papers in the current edition focuses on a topic or theme that directly, or indirectly, affects the professional work of learning support and resource teachers. This range of topics indicates the multidimensional nature of

the challenges that resource and learning support teachers face in our schools. Few would disagree with the contention that learning support and resource teachers are "worth their weight in gold".

ILSA, as an association, is firmly entrenched as a "watchdog" over educational policy-generating domain. ILSA keeps a close watch on developments and makes representations and written submissions to state bodies whenever policy developments or change, which might impact on the work of learning support is anticipated or planned.

ILSA has recently changed the format of its quarterly newsletter from hard copy to a web-based product, available on the website and also emailed to members. As well as highlighting developments in the regions, the newsletter now also carries newsworthy items and also a number of articles that will be of interest to our members. We hope that this new format finds favour with members and we always welcome articles and views from members to publish in the newsletter.

Learn is of course, the literary and research flagship of ILSA. It is a publication of great importance, status and prestige. Copies of *Learn* are placed on the library shelves of each of our National Universities, Education Centres and Colleges of Education. M.Ed., doctoral and undergraduate students regularly use and refer to past publications of *Learn* in their research and studies. Hopefully, *Learn* is also on the desk of each learning support teacher!

As always, we appeal for the submission of papers from members, especially members who are undergoing studies towards a Diploma, Master's degree or higher. The publication of teacher research findings in *Learn* is a vehicle that allows teachers to impact on and influence current educational policy and to supplement theoretical and conceptual knowledge.

MATT REVILLE
Editor of *Learn*
August 2013

Interrogating and Giving Meaning to Numeracy

Jerry McCarthy

The focus of this investigative essay is to provide insights into policy gestation, research findings and some current thinking about numeracy.

There is rich evidence in educational research literature to suggest that emergent educational policy has always been significantly influenced and scripted by some combination and blend of the following change-catalysts: mutation and change in paradigmatic, epistemological and conceptual understandings (O'Sullivan, 1993)(O'Sullivan, 1995); the aspiration to achieve some social, educational or curricular objectives; the desire or requirement to synchronise and harmonise indigenous educational policy constructs and orientations with the stipulations, charters and edicts of international agencies (e.g. United Nations and European Union); the ambition to keep pace with international trends in education, as a response and reaction to findings and disclosures, from international and comparative investigations of student attainment and performance levels, which highlight and provide evidence of Irish student underachievement and underperformance, in specific curricular domains, relative to, and when compared and benchmarked with, students of similar age, ability, background and gender in other countries; as a response to findings and recommendations from Department of Education and Skills inspectorate evaluations; in response to results and insights from, nationwide attainment testing and State Examinations Commission's reports; and, as a means and conduit for scripting, activating and implementing curricular change in schools, as advocated by the National Council for Curriculum and Assessment.

The current indigenous and international policy momentum in education towards establishing numeracy enhancement and cross curricular numeracy development – as core and root educational and curricular priorities, for second level schools – will, almost certainly, have been significantly scripted and accelerated by the confluence and weaving together of insights and influences from several domains. Without doubt, emergent insights and understandings from the underpinning epistemological domain – which re-conceptualised and re-framed numeracy as a multilayered construct, which encompasses and incorporates cognitive and meta-cognitive frameworks of competencies, together with key knowledge and skills, which have the potential to significantly

enhance and extend a student's capacity to learn, comprehend and engage in analysis and higher-level thinking in every subject area across the curriculum - will have had a significant and profound impact on the formulation and framing of these policy constructs. There is every likelihood that this emergent epistemological reframing of numeracy will have been instrumental in initiating multiple discourses and conversations which resulted in international agreement and consensus that numeracy "should be an important focus of schooling because numerate students are better able to learn at school and are better equipped for their everyday lives and their lives post schooling" (Kemp and Hogan 2000). These seminal epistemological insights must also have been investigated, assimilated and adapted by curriculum planners and policymakers in order to formulate and script a hypothesis and operational blueprint on "how" students' numeracy standards could be improved and enhanced in second level schools: because numeracy has now been re-conceptualised as having a fundamental impact on a student's capacity to learn in all areas across the curriculum – by juxtaposition, deduction and extension – numeracy could now be prescribed, defined and activated as "every classroom practitioner's business!" In this emergent and innovative policy blueprint and scenario, every subject teacher becomes actively involved in, and takes responsibility for, the effective teaching of the multiple "numeracy moments" and numeracy demands that arise, on a daily or regular basis, in his or her classroom. In this emergent policy construct, the subject teacher has been clearly identified as the designated, key and primary agency for delivering and achieving enhanced numeracy standards in schools. Furthermore, to maximise the chances and likelihood of this policy and innovation succeeding in schools, the underpinning blueprint was further amended and expanded to ensure that a school-wide, cooperative and collaborative dimension was in-built and grafted into its framework. Through this extension to the policy blueprint, the planning and implementation of consistent, integrated, collaborative, cross curricular and school-wide approaches to numeracy development had been identified – and mandated within the policy – as the optimum conduit and process for achieving the desired improvements and advancement in the numeracy outcomes of students in second level schools. In this extended educational policy framework school wide collaboration, integration and teamwork had been identified as the optimum medium and lubricant to coalesce and synchronise the multiple energies and efforts of individual practitioners and subject departments into a unified whole, on a common mission, to improve students' numeracy.

The planning pathway and journey to the effective and successful implementation and realisation of school-wide, cross curricular numeracy development, can be challenging and arduous for many second level schools. The protracted nature and meandering of this planning journey is not surprising, because current understandings of numeracy – and how collaborative approaches can scaffold and enhance numeracy development – are still at a formative stage

in educational research literature and are still evolving. However, insights from research literature on school development planning and organisational change, categorically state that this journey needs to be strategically and systematically planned, plotted, coordinated, monitored and managed so that every classroom practitioner, every subject department and the staff as a whole, is given ample opportunity and time to become aware of, reflect on, discuss, investigate and develop shared understandings of, and collective insights into, the core dynamics and nuances of numeracy. Schools need to take sufficient time, to systematically and comprehensively investigate and clarify the multiple specifics, issues and nuances that are embedded in numeracy, numeracy planning and numeracy development. Ab-initio and from the outset, individual practitioners, subject departments, and the school staff as a collective, need to reflect on, discuss and develop shared understandings about: what exactly is numeracy?; what skills and competencies does a numerate student possess?; what constitutes numeracy behaviour?; what advantage does a numerate student have in the learning of my subject?; what advantage does a numerate student have in my classroom?; does numeracy matter in my classroom?; what is our shared understanding and working definition of numeracy?; what are the "numeracy moments", opportunities and demands that arise in the teaching and learning of my subject?; in what ways am I currently supporting numeracy development through my teaching?; what are the core nuances and dynamics of numeracy that need to be discussed, exemplified, elaborated and regularly revised?; what role does school mathematics play in developing numeracy competencies and skills in students?; what pedagogies are effective in supporting the development of students' numeracy?, what approaches and structures will improve students' transfer of knowledge across subjects or contexts?; what forms of structure and collaboration will create the optimum conditions for successful school-wide and cross curricular numeracy development?; what are the methodologies, pedagogies and approaches that characterise good and integrated teaching of numeracy?; what are the methodologies, pedagogies and approaches that characterise good and integrated teaching of numeracy across the curriculum?; what are the common and shared numeracy themes that exist between subject areas?; what are the consequences of being innumerate in the formal schooling environment and in society?; what cognitive capital and cultural advantage does a numerate student have in the processes of formal learning?

School staffs that embark on a planning journey towards numeracy development – without first nurturing and developing a reservoir and bedrock of shared understandings and collaborative insights into the various dynamics of numeracy, without first articulating and developing a shared vision and mission, without first developing a collective awareness of the rationale for consistent and prolonged engagement with this specific strand of numeracy innovation and change, and without first nurturing and developing a shared willingness and motivation to work collaboratively as a team to bring about the required

improvement in students' numeracy and learning outcomes – are attempting to graft and embed a planning and numeracy development edifice onto a conceptual wasteland and a specifics vacuum!

Educational research literature on school development planning and organisational change has identified and prioritised a suite of key investigative lenses and interrogative signposts, namely: – What?; Why?; How?; How long?; How to assess?; Where?; When?; With whom?; For whom? – that can be employed by a school to provide a strategic focus to staff discussions, on numeracy development, and, in addition, to script the school's journey towards cross curricular numeracy development. However, it is my experience – acquired from engaging with second level schools over many years – that the investigative dimension that usually poses the greatest challenge and difficulty for teachers is the initial phase of seeking to demystify, make sense of, and give meaning to the various dynamics, components and conceptualisations of numeracy. It may be stating the obvious, but numeracy is not easy! Finding consensus and agreement on a working definition of numeracy, across the school staff, is not easy! My experience of engaging with second level schools would suggest that, prior to their embarking on substantial and robust investigations and having multiple discourses on numeracy, most subject practitioners possess incomplete, personalised and subjective interpretation and understanding of what numeracy is and what numerate behaviour in students involves and entails. A questionnaire, that I designed, constructed and distributed, during CPD sessions and in-service engagements, to many second level staffs – seeking to identify their initial and rudimentary perceptions and understandings of numeracy – yielded and provided me with many different interpretations and definitions of numeracy!
Willis (1998) suggests that many of the definitions and typologies, that are documented and discussed in educational research literature, are incomplete and one-dimensional. Kemp and Hogan (2000) state that the range and diversification of typologies and definitions of numeracy, that have been documented in educational research literature, clearly suggest that there are many differences in the way that people perceive and define numeracy. Some of these non-holistic typologies prioritise and highlight the "mathematical content" and conceptual dimension of numeracy, namely: the menu of concepts and knowledge that students need to know and understand to be considered numerate. Other typologies lay emphasis on the "process" dimension of numeracy and highlight the skills-set and range of procedures that the student needs, to develop fluency and competency, so that he or she can successfully and effectively use and apply numeracy across a range of contexts and situations, in-school and out-of-school. Additionally, educational research literature also contains another genre of typologies, which prioritises the listing of the range and diversification of "practical tasks and assignments" that the students should be able to perform or meet to be considered numerate. Still another genre of typologies prioritises and primarily focuses on, the role and impact of "affective"

and "generic" variables and nuances in the student' s numeracy engagements. These include: the levels of motivation, disposition, perseverance, dedication, self-efficacy and resilience that the student currently possesses and exhibits in his or her engagement with the presented numerical task. And finally, research literature also describes the more holistic and inclusive genre of typologies, which makes reference to, and incorporates, all the core dimensions, dynamics and nuances of numeracy, including the key cognitive and meta-cognitive dimensions.

O'Donoghue and O'Rourke (1998) claim that three distinct and broad genres of definitions, typologies and conceptualisations of numeracy can be identified in international educational research literature. One genre of typologies relates to the suite of social requirements that underpin numeracy and being considered numerate. A second genre of definitions points to the strong link that exists between numeracy and mathematics. Finally, the third genre highlights the connections and linkages that exist between numeracy and literacy. These researchers contend that all three genres of typologies possess one common dynamic and overarching orientation, namely: the unique role that numeracy performs in enhancing communication and in the effective transmission of information in order to facilitate the student's understanding of the world.

I will now investigate, discuss and provide some exemplars of the range and diversification of typologies and definitions of numeracy that are documented in educational research literature.

Cockcroft (1982) claimed that the word "numeracy" was coined in 1959 in the U.K. Committee on Education (Crowther) Report. The writers of the Crowther Report defined "numeracy" as *"the mirror image of literacy"*. This report also provides us with the following seminal conceptualisation and definition of numeracy: *"By numeracy we mean not only the ability to reason quantitatively but also some understanding of scientific method and some acquaintance with the achievement of science"*. This report also identifies some of the nuances and dynamics of numeracy: *"On the one hand is an understanding of the scientific approach to the study of phenomena – observation, hypothesis, experiment, verification. On the other hand, is a need in the modern world to think quantitatively, to realise how far our problems are problems of degree even when they appear as problems of kind. Statistical ignorance and statistical fallacies are quite as widespread and quite as dangerous as the logical fallacies that come under the heading of illiteracy"*.

It is clear that the seminal Crowther Report conceptualised and interpreted numeracy as encompassing complex cognitive and meta-cognitive frameworks in the same way as the concept of literacy does. In this seminal report, both numeracy and literacy are conceptualised as overlapping and complementary competencies that are needed to support the life-long aspirations of an educated

person. Consequently, from their geneses, the identification and highlighting of the similarities and symbiotic relationships that were perceived to exist between the emerging concepts and processes of literacy and numeracy, have inevitably resulted in both concepts being bracketed together in the public consciousness and in educational debate and theses.

This primordial and intrinsic intertwining and integration of literacy and numeracy is very much in evidence in documentation produced by the United Nations over the last fifty years where references are made to mathematics or calculations as critical components of literacy (Gal, 2000)(O'Donoghue 2002). Pearse and Walton (2011) also investigate this integration thesis and claim that *"there is little doubt that literacy and numeracy are connected. Being numerate requires the person to be literate to understand numbers in context"*. Pearse and Walton (2011) contend that *"numeracy can be described as a fundamental literacy that is crucial to people's engagement with the world in which they live. We can thus say that it is not a discipline but, rather, a language crucial to most disciplines"*.

O'Donoghue (2002) has tracked and documented the specific evolutionary phases in the genesis and evolving conceptualisations of numeracy:

- **Phase 1:** Seminal interpretation and conceptualisation of numeracy: Numeracy is portrayed and defined as a "mirror-image of literacy"
- **Phase 2:** Stand-alone literacy (no explicit concern for the development of a linkage with numeracy)
- **Phase 3:** Literacy (literacy and numeracy are linked together with additional stated concern being focused on the 3Rs and basic mathematical skills) (Marks and Ainley, 1997)
- **Phase 4:** Stand-alone functional numeracy (numeracy is depicted as being completely detached from literacy)
- **Phase 5:** An expansive conceptualisation of Literacy (numeracy and quantitative literacy are recognised as integral aspects and components of literacy)(Dossey, 1997) (Forman, 1997)
- **Phase 6:** A more holistic conceptualisation and typology of Literacy (there is a clear identification and specification of the various types of literacy, including: mathematical literacy, scientific literacy, critical numeracy, statistical literacy, critical mathematics (Frankenstein 1987) (Yasukawa et al. 1995) (Watson 1995)
- **Phase 7:** Stand-alone conceptualisation of Numeracy (numeracy is depicted and defined as an independent and critical life-skill which is independent and detached from literacy and entitled to the same status and importance as literacy).

O'Donoghue (2002) states that, in his opinion, there is no definitive, holistic, complete or universally-accepted definition, conceptualisation or typology of numeracy documented in educational research literature. O'Donoghue also contends that, in the past, the use of the term "numeracy" has been restricted and regulated and has not been generally and universally used within the wider educational discourse. Most of the early references to numeracy and numerical literacy are contained in the strand of indigenous educational research literature, assessment reports and policy documents that are focused on the domains and issues of underachievement, early school leaving and disadvantage. As a consequence of this projected, documented and symbiotic coupling with underachievement and disadvantage, numeracy came to be perceived and conceptualised as a low-status activity or skills-set within the hierarchical spectrum of second-level mathematics. Consequently, the full potential of numeracy and numerical literacy – as key processes, agencies and conduits, that can significantly inform, script and mould our capacity to think critically, to engage in higher-level-thinking, to be successful in formal learning and to successfully engage with modern life's challenges – remained obscured and untapped for a prolonged period. Happily, since the 1990s, emergent and contemporary definitions of numeracy have finally unwrapped and revealed the great potential – to support thinking, decision-making, analysis, creativity, investigation, learning and living – that is contained within numeracy and numerical literacy.

O'Donoghue (2002) suggests that in many non-English speaking countries the term "numeracy" does not exist and there is no corresponding term in the language for what it is or signifies. FitzSimons et al. (2000) state that, in certain European countries, numeracy is not perceived and debated as a stand-alone entity and process but is consistently conceptualised as an integral, embedded and core component of Mathematics and Mathematics Education. The term "numeracy" is not generally or universally used in educational research literature and discourse in the United States; however, their researchers and classroom practitioners use the term "quantitative literacy" to refer to, and describe, the equivalent suite of numerical skills, knowledge and meta-cognitive competencies that we label in Ireland as "numeracy".

In his macro and seminal report, "Mathematics Counts: A Report into the Teaching of Mathematics in Schools", Cockcroft (1982) uses the term "numerate" to imply the possession of two personal competencies: *"We would wish "numerate" to imply the possession of two attributes. The first of these is an at-homeness with numbers and an ability to make use of mathematical skills which enable an individual to cope with the practical demands of his everyday life. The second is ability to have some appreciation and understanding of information which is presented in mathematical terms, for instance in graphs, charts or tables or by reference to percentage increase or decrease."*

Just as the early definitions of literacy have progressed from "reading and writing", today's conceptualisation of numeracy have progressed and advanced and currently encompass much more than the one-dimensionality of mere "numbers and measurements" (http://www.curriculumsupport.education.nsw.gov.au).

Girling (1977) produced a stark, one-dimensional and restricted typology of numeracy when he summarised numeracy as *"the sensible use of a four-function calculator"*.

Wikipedia states that the term "numeracy" is a contraction of "numerical literacy" and refers to an ability to "*use numbers*" and *"to reason with numbers and other mathematical concepts*".

Aspects of numeracy include "number sense, operation sense, computation, measurement, geometry, probability and statistics" (http://en.wikipedia.org/wiki/Numeracy).

O'Donoghue (2002) describes numeracy as two intertwined spectra or continua. He claims that *numeracy "spans a spectrum of personal abilities from basic skills to higher-level cognitive abilities such as problem solving and communication"*. In addition, he also suggests that numeracy also spans and overarches a second spectrum of mathematical content, ranging from "*little or no mathematics*" to *"quite powerful mathematics"*.

The macro "Numeracy = Everyone's Business" report of the Numeracy Education Strategy Development Conference in Australia (Education Department of Western Australia and Australian Association of Mathematics Teachers Inc., May 1997) conceptualises and describes numeracy as a multidimensional and meta-cognitive framework involving the disposition to use some combination and blend of: "mathematical knowledge", "contextual knowledge" and "strategic knowledge", together with general thinking skills and analytical competencies. Willis (1998) and Kemp and Hogan (2000) further develop and extend the 1997 AAMT thesis. These researchers state that "mathematical knowledge" encompasses and involves knowing, understanding and using fundamental and primordial mathematical ideas and concepts, which typically comprise the formal school mathematics curriculum in Number (and number sense), Measurement (and measures), Geometry (space and shape), Algebra (and patterns) and Statistics (data, data handling and probability). The term "mathematical knowledge" also refers to mathematical thinking and use of mathematical strategies and approaches to solve problems. In this extended typology, "contextual knowledge" is defined and described as embracing, involving and resonating with an in-depth understanding of the contextual features of the mathematics that present in a given situation. This contextual genre of knowledge encompasses and incorporates an understanding of what

terms mean in the presented context and what interpretations make sense. This genre and level of knowledge requires much more than a superficial and rudimentary familiarity with the context; it requires an in-depth understanding of how the mathematics and numeracy in the situation is shaped by the context. These Australian researchers describe "strategic knowledge" as a suite of meta-cognitive competencies and critical cognitive abilities, orientations and dispositions which become activated in order to plan and manage one's way through routine or non-routine problem situations. This genre of knowledge also refers to capacities to identify the key components of presenting problem, make assumptions based on data presented, hypothesise and strategically plan and carry out a course of numerical or mathematical actions that will lead to a solution. This genre also includes a capacity to self-correct, justify and validate one's solution and to identify alternative approaches to acquiring a solution. Generalised thinking competencies and generic judgement capacities and skills, together with positive dispositions and attitudes, are also included and assimilated into Willis' typology and conceptualisation of the multi-dimensionality and complexity of numeracy.

In their 2002 report, Morony and Brinkworth (Eds.) declared that numeracy involves four core dynamics and orientations:

"Using ... Some mathematics .... To achieve some purpose ... In a particular context".

This condensed and terse typology of numeracy, frames and positions numeracy as a multi-functional and multi-purpose matrix which is informed by, and incorporates: key mathematical knowledge, finely-honed skills of "use" and application, trans-contextual relevance, general intelligence competencies and astute judgement capacities, which become activated to determine whether there is an numerical orientation in the presenting problem or task – or not – and whether the use of numerical methodologies, logic, inquiry, reasoning, computation and processing can lead to a solution or resolution. By extension and projection, this AAMT descriptor and typology infers and suggests the many cognitive advantages and intellectual strengths and capacities that a numerate student has in his or her engagement with the formal learning environment of a second level school. Equally, the "to achieve some purpose" strand of this typology, is grounded in an interpretation and understanding of the multi-functionality of numeracy as a basic, rudimentary and fundamental learning and thinking competency but, also, as a continuum of capabilities and abilities, up to and including higher order thinking capacities. Equally, the "in a particular context" clause is firmly anchored in an understanding and acknowledgement that numeracy encapsulates and incorporates, not only a matrix of knowledge, skills, learning and thinking competencies – that are primarily employed within formal schooling - but also recognises that numeracy is also a critically important life skill and a key identifier and determinant of a student's prospects when it comes to employability and career. A further in-depth parsing – of the four

phrases combined – leads the reader to conclude that numeracy is also being interpreted and conceptualised, by these researchers, as a personal and intellectual capacity and web of skills and processes that transcend far and beyond the contours and boundaries of the school's mathematics curriculum. In this typology, numeracy is being framed and depicted, as having cross curricular impact and relevance across the second level school curriculum. This conceptual re-framing, firmly embeds numeracy development within the tapestry and rubric of the teaching and learning that occurs in every subject area and in every classroom, in the second level school. This conceptual re-scripting clearly identifies numeracy as a key process and conduit that enable the student to successfully and effectively engage with, and unlock, the multiple learning challenges and demands that are encountered across a range of subject areas within the second level curriculum. Conversely and by extension, any student who is not numerate, and does not possess adequate skills and competencies in these three key domains, is significantly at risk of failure to learn in the cauldron of teaching and learning in every subject area across the second level school.

It should be noted that the "some mathematics" stipulation and clause does not exclusively refer to just the student's level of knowledge of the "mathematical underpinnings" and "conceptual content" of the core and fundamental areas of mathematics – but also refers to the "processes", "skills" and "uses and applications" dimensions of mathematics which universally transcend beyond the traditional boundaries and contours of the mathematics classroom and have an immediate and direct applicability in teaching, learning, understanding and thinking in every subject area across the curriculum. Some of these transcendent and transferable skills include: estimating, representing, computing, counting, locating, logically analysing and the solving of problems which contain a numerical or mathematical orientation. While this conceptualisation and typology of numeracy involves and infers an understanding of some mathematical ideas, notations and techniques, it also involves drawing on knowledge and analyses of particular contexts and circumstances in deciding when to use mathematics, in choosing the mathematics to use and in critically evaluating its use. In general, each individual's interpretation of the world draws on internalised understandings of number, measurement, probability, data and spatial sense combined with critical mathematical thinking. This typology encapsulates and is grounded in this reality.

Walker-Glenn and Reynolds (2007) and the National Research Council (2001) also developed an extended typology of numeracy and pinpointed the following dynamics as core components, namely:

- **Conceptual understanding:** This refers to the possession of knowledge and understanding of mathematical concepts, operations, and insights into the web of connections and linkages that exist between

mathematical and numerical domains. It also embraces and encapsulates a knowledge and understanding of what mathematical symbols, diagrams and procedures mean in diverse contextual situations.

- **Procedural fluency:** This refers to the acquisition and possession of competencies and skills to perform and carry out numerical operations with accuracy, fluency, efficiency and appropriately.
- **Strategic competence:** This suite of competencies encapsulates and incorporates the acquisition and possession of a wide range of abilities and capacities to formulate, represent, devise strategies, apply and solve numerical problems, tasks and assignments, using underpinning, related and embedded concepts and procedures appropriately.
- **Adaptive reasoning:** This refers to capacity for engaging in logical thought, reflection, explanation, verification and justification, together with a capacity to extend and use what is known to discover something that is not yet known.
- **Productive disposition:** This refers to a learned or habitual inclination to see and perceive numeracy and mathematics as sensible, useful, and worthwhile, coupled with a belief in one's own efficacy, perseverance and resilience to complete the presented numerical task and assignment. This disposition resonates with the values-set and norms-set that declare that numeracy and mathematics are multi-functional, useful and do-able if one works at it.

The multi-dimensionality and complexity of numeracy are captured and described in the typology that was developed by Pearse and Walton (2011). These researchers claim that "*numeracy is braiding together mathematics, language and thinking. Numeracy is an appreciation of common numerical sense which a depth of reasoning and critical thinking around how numbers change our world*".

Noss (1990), in developing his typology, focused on the multi-site impact and multi-contextual applicability that numeracy has outside of the formal school environment by describing numeracy as a *"set of tools"* for living.

Kemp and Hogan (2000) suggest that numeracy is "*having the disposition and critical ability to choose and use appropriate mathematical knowledge strategically in specific contexts*".

The contextual dimension of numeracy is revisited in the typology developed by Askey et al. (1997). Here numeracy is defined as *"the ability to process, communicate and interpret numerical information in a variety of contexts"*.

The effectiveness of numeracy, to unlock and enhance learning across a range of diverse contexts, is investigated in Marzano's research (2007). Marzano suggests

that *"numeracy is about applying elementary tools in sophisticated settings. It involves the capacity to identify similarities and differences through categorising and organising information"*. The findings of this thesis are revisited and mirrored in Steen's research (2001) where he claims that *"numeracy empowers people by giving them the tools to think for themselves"*.

Brown et al. (1998), referring to the National Numeracy Strategy in Britain, remarked that: *"it seems that the National Numeracy Strategy is using the word numeracy in a way that may have been imported from the USA, meaning mathematical literacy"*.

The PISA (Programme of International Student Assessment) Report (2007) provided the following definition of a numerate person: *"The two characteristics of the numerate person are: (1) the ability to use mathematics in everyday life and (2) the ability to understand and appreciate information presented in mathematical form"*. Pearse and Walton (2011) suggest that *"PISA states that numeracy looks less at what mathematics a student knows and more at what the student can do with the mathematical knowledge he or she has acquired"*.

Booker et al. (1997) state that *"numeracy is concerned with using, communicating and making sense of mathematics in a range of everyday applications; the ability to explore, hypothesise and reason logically and to use a variety of methods to solve problems"*.

Johnson (1994) states that *"Numeracy is a critical awareness which builds bridges between mathematics and the real world, with all its diversity. In this sense, there is no particular level of mathematics associated with it: it is as important for an engineer to be numerate as it is for a primary school child. The different contexts will require different mathematics to be activated and engaged in…"*

Steen (1997) provides the following insights into the concepts and processes of numeracy: *"There appears to be reasonable consensus among individuals of widely differing perspectives on the natural growth of numeracy from the basic arithmetic of grade school through the more sophisticated numerical reasoning of measurement, ratios, percentages, graphs and exploratory data analysis that is now the centrepiece of middle school mathematics"*.

The "Framework for Teaching Mathematics", (DfEE 2001), provides the following definition of numeracy: *"Numeracy is a proficiency which is developed mainly in mathematics but also in other subjects. It is more than an ability to do basic arithmetic. It involves developing confidence and competence with numbers and measures. It requires understanding of the number system, a repertoire of mathematical techniques, and an inclination and ability to solve quantitative or spatial problems in a range of contexts. Numeracy also demands understanding of the*

ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables".

Tanner et al. (2002) state that, although numeracy is certainly based on knowledge of key number and computational facts and processes, today's definitions of numeracy seem to have expanded and extended the boundaries and domains of numeracy to encompass, embrace and include beliefs and attitudes towards mathematics, an understanding of how mathematical processes work and an ability to apply such knowledge in problem solving and the learning of new mathematics.

Tanner and Jones (2000) define numeracy as the possession of a suite of competencies and skills, which include:

- *knowing enough mathematical structure to be able to use what you know to work out what you don't know*
- *being fluent with number, being at ease with it, so that you can play around with it to get what you need*
- *knowing the language, grammar and symbolism of mathematics*
- *being able to solve problems with number and language and knowing when your answer is reasonable*
- *coping with the demands of everyday life and knowing how to choose an efficient process in any situation which will lead to a reliable answer*
- *knowing when it is appropriate to use a calculator*

Tanner and Jones (2000) suggest that a numerate person possesses some / most / all of the following characteristics and attributes:

- *a willingness to have a go at questions involving number*
- *a confident knowledge of some basic number facts and a willingness to use them to derive new facts, about which they are then equally confident*
- *a realistic sense of the size of the set of numbers that he knows and how they fit together*
- *a satisfactory knowledge of how to perform calculations or solve problems in more than one way*
- *an inclination to sometimes checks his answers by employing another alternative and valid methodology*
- *an ability to employ estimations and to check the answers to simply calculations*
- *often has his own personal ways of working calculations out mentally or in writing*
- *has an ability to explain and justify orally the methods that he uses to perform calculations*
- *prefers to use mental calculations as his first resort*
- *enjoys doing and talking about mathematics*

Ryan and Williams (2000) contend that the process dimension of numeracy can be interpreted and described as the "knowing how" of numeracy. Harvey and Goudvis (2007) claim that this process dimension refers to "what students have to do with the content". Dossey (1997) states that process refers to, and incorporates, the student's ability to act and interpret in a wide variety of mathematics-related settings. Also, process encapsulates the suite of procedures, multi-sensory stimuli and modalities that enable the student to unlock understand and successfully engage with the content of the mathematics curriculum and the numeracy moments that occur in other subject-areas across the curriculum.

Van De Walle (2004) states that the process dimension of numeracy contains and encapsulates the following components:

- Computation (carrying out number operations and calculations)
- Problem Solving, Uses and Applications of Numeracy
- Making Connections (using abstractions and generalisations)
- Language and Communication
- Representation and Visuals
- Reasoning and Proof

Ryan and Williams (2000) suggest that the conceptual knowledge dimension of numeracy refers to the "knowing why" of numeracy. Advanced conceptual knowledge involves and incorporates an understanding of the mosaic of conceptual frameworks within numeracy and mathematics and across the range of subject areas and how the various elements connect and interconnect with each other. Harvey and Goudvis (2007) contend that the content and knowledge dimension of numeracy refer to "what students learn".

Dossey (1997) identifies and describes the six fundamental and primordial strands of mathematics that have become conventionally defined and categorised as the content of numeracy, namely:

- Number (including number sense, memorised number facts and operational sense)
- Measures and Measurement
- Space and Shape (Spatial Visualisation and Geometric Shapes)
- Data, Data Handling, Data Representation and Interpretation
- Number Patterns, Number Relations and Basic Algebra
- Chance and Probability

Thomson (1999) claims that the "use and apply" dimension of numeracy has been neglected and under-prioritised in educational research and in classroom practice up to now because of an inaccurate and too-narrow conceptualisation of numeracy.
Pearse and Walton (2011) claim that *"building conceptual connections is at the heart of numeracy"*.
Willis (1996) strongly contends that a cross curricular and school-wide approach to numeracy development are required in schools if students' numeracy levels and standards are to be enhanced and improved.
Numeracy is defined in the DES (2010) draft document ("Better Literacy and Numeracy for Children and Young People: A Draft National Plan to Improve Literacy and Numeracy in Schools") as: *"The capacity, confidence and disposition to use mathematics to meet the demands of learning, school, home, work, community and civil life. This perspective on numeracy emphasises the key role of applications and utility in learning the discipline of mathematics and illustrates the way that mathematics contributes to the study of other disciplines"*.

The DES (DES 2011 in "The National Strategy to Improve Literacy and Numeracy among Children and Young People, 2011-2020") provided the following definition of numeracy: *"Numeracy is not limited to the ability to use numbers to add, subtract, multiply and divide. Numeracy encompasses the ability to use mathematical understanding and skills to solve problems and meet the demands of day-to-day living in complex social settings. To have this ability, a young person needs to be able to think and communicate quantitatively, to make sense of data, to have a spatial awareness, to understand patterns and sequences, and to recognise situations where mathematical reasoning can be applied to solve problems."*

The contemporary conceptualisations and prioritisation of numeracy and numerical literacy, as expressed in both DES policy publications, are grounded in a holistic and in-depth understanding of the multiple dynamics of numeracy and in a keen awareness of the immense potential that numeracy possesses to support and enhance the development of knowledge, skill sets and higher-level-thinking capacities in all students so that they can successfully engage with the numeracy challenges that regularly occur across the second level curriculum, as well as in life and in employment.
Multiple findings and insights from educational research literature suggest that students' numerate behaviour and performance are profoundly determined by the chemistry and symbiosis that is generated in the interfacing and blending of influences from multiple domains, namely: the incoming mathematical, contextual and strategic stimuli which interact with the student's stored reservoir of mathematical, contextual and strategic knowledge; the student's level of familiarity, fluency and practice in the use and application of numerical processes and skills; the student's generic, cognitive and meta-cognitive capacities; the student's memory store; and, influences from the affective domain (e.g. current

levels of disposition resilience, motivation, self-efficacy, self-esteem). Because the student's quality and level of engagement, performance and achievement, in carrying out some presented numerical task or assignment, are profoundly influenced by the blending of, and the chemistry between, these domains, we may conclude that numeracy behaviour can be accurately described as: personalised, individualistic and context specific. Furthermore, since each of these interfacing domains has embedded within it a continuum and diversification of domain-specific elements or personal capacities, it would appear more appropriate to interpret and define numerate behaviour – not as having its roots in, and deriving from, any one, specific and atomistic domain – but in conceptualising numerate behaviour as being instigated and activated by stimuli and influences from a matrix of domains. In this interpretation and thesis, it may be more accurate to speak of "numeracies" rather than one, singular "numeracy". In this thesis of "multiple numeracies", each specific and distinct "numeracy" can be differentiated, labelled and categorised, by reference to the precise combination and array of underpinning competencies and stimuli that have been assimilated and activated, by the student, in order to perform the desired and required numerate activity or task, on that particular occasion.

In essence, being numerate refers to context-specific, differentiated and individualistic suites of capabilities and capacities which do not remain static but are in a constant cycle of mutation, adjustment, assimilation and accommodation due to the impact of incoming stimuli from multiple domains and zones of influence. Kemp and Hogan (2000) suggest that, because of the cross-pollination and cross-blending of influences, that significantly determine students' level of performance in numeracy, it would be more correct to speak of a student being "more or less numerate" with respect to particular situations and contexts rather than employing the absolutes and archetypical descriptors, polarities and labels of numerate or innumerate per se.

A fundamental and universal aim of second level education is to promote and improve student learning across the curriculum in order to prepare them for examination success, for further education, for active citizenship, to enhance their employability prospects and to prepare them for their lives outside school. The development and enhancement of students' numeracy in second level schools is essential if they are to become successful and effective learners in mathematics and across the curriculum and if they are to function efficiently in employment, in social contexts and throughout her lives. To ensure that the required tsunami of numeracy planning, development and improvement will take place in our second level schools, every school practitioner will need to be able to recognise what numeracy looks like, what its dynamics are and where it is found. It is critical that every teacher comes to recognise that there are many existing situations in their subject areas where there are numeracy demands and challenges for the student, as well as ones that the practitioner can plan and

initiate to provide extended opportunities for students to develop their numeracy. Some second level teachers report that they have difficulty recognising the mathematics and numeracy processes that are embedded in their subject texts, let alone see them as a numeracy issue. Each subject practitioner, and subject department, will have to arrive at an awareness and shared understanding that students' numeracy performance and engagement always involves the activation and utilisation of mathematical, contextual and strategic knowledge and skills. Without this level of awareness and understanding of the interfacing and blending of key domains within numeracy, subject practitioners cannot effectively support their students' numeracy development or accurately diagnose and remediate students' problems, errors and misconceptions within numeracy.

Every journey begins with a first step. The planning journey to successful school-wide numeracy development and numeracy enhancement, that every second level school is currently mandated to undertake, also has a critical first step, namely, taking time and providing opportunities to develop shared understandings about numeracy among its entire teaching cohort. This first and in-depth investigative step needs to be thorough, rigorous, forensic, inclusive, collaborative and not rushed. The success of the school's subsequent engagement with school-wide numeracy planning and development will be profoundly determined and scripted by the effectiveness of this first investigative step. In essence, the strategic, focused and thorough planning of this investigative first step will ultimately impact on, and enhance, our students' life chances and style of life. We should never forget the stark contention of Brynner and Parsons (1999) – researchers with the National Numeracy Strategy (GB) – who categorically state that *"poor numeracy skills are a greater impediment to life chances than poor literacy skills"*. For all our students' sake, effective school-wide numeracy planning and development is well worth striving for in all our schools.

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Improving reading skills for older struggling readers

Yvonne Mullan

This article is an abridged version of a chapter called *Reading* in a document called *Developing Basic Literacy and Numeracy skills in Youthreach and Community Training Centres* which will soon be published on the NEPS website.

Introduction

Throughout this article, older struggling readers are referred to as readers, not just because it is a more optimistic term but because it is shorter. This chapter should be of interest to teachers of readers who are in their teens or older and who often find the challenges involved in improving literacy skills too great to be worth the effort. It begins with advice about two essential requirements for success – knowing the reader and choosing the right text. The third section contains practical advice about assessing and teaching in key areas

Get to know the reader

Standard scores and percentiles indicate how a reader's score compares to the scores of the population on whom a test was normed, but these scores do not help teachers to know the exact skills that need to be taught to readers. In order to know where to start, teachers need to get to know readers so that teaching can match individuals' skills and confidence needs and so that text can match individuals' music, sports or other interests. Detailed assessment of reading skills takes time and requires the building of trust and relationships. Guided practice, a time when a reader reads or writes with a teachers who provides occasional gentle feedback and assistance, is the perfect time to assess readers' skills and it is also the perfect time for teachers to teach at the cutting edge of readers' understanding (Chandler-Olcott and Hinchman, 2005). Advice on methods of assessment for teaching is given under each of the key areas.

Choose the right text

Motivating, Authentic Text

Since individual readers' interests may vary considerably, it is wise to let readers choose their own reading materials whenever possible and to provide them with a selection of texts – print and non-print – at different reading levels, so that they

will be motivated to read. Some of the most motivating texts for readers are freely available on the internet from newspaper and television websites. Schools should invest in a variety of genres of text each year (graphic novels, fiction, non-fiction, poetry, magazines and newspapers) in order to build up a wide selection of texts for readers to read.

Involvement

One way to motivate readers to read is get them involved in texts that are authentic, interesting and relevant to their lives. One aspect of involvement is when a reader is so fully absorbed in reading that they lose track of time. The more cognitive and social aspects of involvement focus on the comprehension processes necessary for effective reading, which allow the reader to understand the message of the text and to give their personal response to it. This involvement happens when readers are allowed to elaborate their personal reactions and points of view to a given text in collaboration with their peers and teachers. Whatever the form given to this personal response (posters, drawings, performances, etc.) such practices have a positive impact on reading motivation because they enable the readers to exercise their autonomy and their ability to think (Adore, 2009).

Text difficulty

Readers can often get meaning from a text that is above their reading level if they are sufficiently interested, have a purpose for reading, have enough background knowledge and have some strategies for tackling difficult text (Irvin, Meltzer and Dukes, 2007). However, texts that are at a frustration level for readers are unlikely to improve self-concept or self-efficacy, both of which are central to improving readers' literacy skills (ADORE, 2009). As well as being aware of strategies that help them cope with challenging texts, readers need to build fluency and basic vocabulary by reading easier texts. For guided reading instruction and for independent reading it is important to have texts at different reading levels so that teachers can match the reading levels of different readers with suitable texts. High-interest (for older teenagers and young adults) low reading level texts use basic vocabulary and short sentences and are sometimes referred to as "high-low" texts. Read more about high low texts *http://www.nbss.ie/sites/default/files/publications/read_-_hilow_books.pdf* and about the readability of texts *http://www.readabilityformulas.com/* and *http://shop.niace.org.uk/media/catalog/product/r/e/readability.pdf*.

Books can have assigned reading ages or lexile ratings (Log on to *http://www.lexile.com/fab/* to read about lexile ratings). However, it is better to trust a reader to choose their own text rather than to give a reader a book simply because they are able to decode it. The main criteria for text choice should be the reader's interest levels and whether the reader can construct meaning from the text. Reading ages are not recommended in educational practice for many reasons, not least because they can be embarrassing for older readers.

Tailor teaching to individual needs in the following key areas:

- **Reading Comprehension**
- **Fluency**
- **Phonological awareness**
- **Phonics**
- **Sight words**

The next sections contain ideas for assessing and teaching in the key areas. Every reader will not need support in every area. Keep the focus narrow when planning classes. Work on one or two of the skills outlined below in a 30 to 40 minute session. Readers often need repeated opportunities to learn something new and they appreciate the chance to practice a strategy in more than one context (e.g. on a different genre of text). An outline of class objectives and activities at the start of class can give a sense of control to readers.

Key Area – Reading comprehension

Assessing reading comprehension

When assessing reading comprehension, it is important to ensure that a reader can read most of a text and that answers are assessed *orally* so that reading skills or writing skills are not confused with reading comprehension skills. Comprehension can be assessed informally by observing, dating and recording how readers answer questions about a text. Progress in comprehension can be monitored through levels of questioning (Table 1) and through more difficult levels of text. Reading comprehension can also be assessed formally using standardised tests.

Table 1. Questions based on Blooms taxonomy from *www.teachertools.org*

Knowledge	label, define, locate, name, outline, repeat, identify, recite, list, state
Comprehension	discuss, explain, provide proof of, provide an outline diagram, make a poster, make a collage, a cartoon strip, answer who, what, when, where, why questions
Appication	report, construct, solve, illustrate, construct, design
Analysis	sort, analyse, investigate, classify, survey, debate, graph, compare
Synthesis	invent, examine, design, formulate, hypothesize, re-tell differently, report, develop a game, song, experiment, generate, compose
Evaluation	solve, justify, self-evaluate, conclude, do an editorial, weight the pros/cons, mock trial, group discussion, judge, criticise, appraise, recommendation backed with informed opinions, why do you think

Teaching comprehension
Readers have a better chance of understanding text when they have some interest in or background knowledge of the content. In the process of making meaning, a reader's background knowledge can facilitate a good guess at an unfamiliar "unreadable" word e.g. the underlined words in the following:

Shamrock Rovers Football Club is a professional football club from Dublin, Ireland. The club's team competes in the Premier Division of the League of Ireland and it is the most successful club in the Republic of Ireland.

Fig. 1 Shamrock Rovers 2012 *http://en.wikipedia.org/wiki/shamrock_rovers_f.c*

1. Use text that is linked to readers' background knowledge
2. Help readers to expand their language skills
3. Work with readers on areas of need (phonics, sight words, fluency)
4. Teach comprehension strategies. Strategies help readers to monitor their own comprehension so that when get stuck on a word or phrase, they know that they need to do something.

Critical Analysis and Graphic Organisers (below) are just two comprehension strategies. Many more can be found on the National Behaviour Support Service website under Publications and Resources (page 3) *www.nbss.ie*.

Comprehension Strategy – Critical analysis:
Think about ways in which writers and illustrators represent their ideas and how backgrounds and cultures influence writing and drawing. Ask yourself who wrote the piece? Are they qualified to write the piece? What was their agenda? Whose voice has not been heard? Is the text believable? Is it up to date? Does it give a full picture? Is it presented fairly or in a distorted fashion? Are sources of the information listed? Do other sources agree with the information given?

Comprehension Strategy – Graphic organisers are a good way to preview material so that you know what is coming and they are even more useful as a way to ***summarise*** information. Log on to *http://www.nbss.ie/sites/default/files/publications/summarising_maps_-_comprehension_strategy_handout__copy_2.pdf* for more graphic organisers.

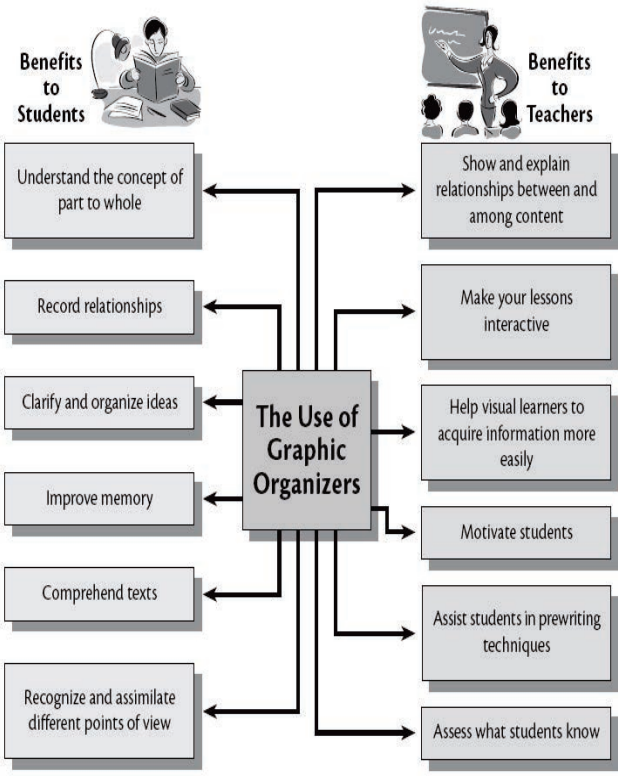

Fig. 2 Graphic Organiser from Education Bureau, Hong Kong, *2012*

Finally, when teaching a comprehension strategy:

- Name the strategy (e.g. predicting, summarising)
- Model how and when to use the strategy
- Support readers to use the strategy
- Give readers time (weeks) to practice using the strategy

Key Area – Fluency

Assessing fluency

In order to assess and monitor progress in fluency, teachers can listen to individual readers reading, then write, date and store observations about fluency in the individual reader's file. A simpler way is to record readers reading on digital recorder, iPhone, iPad, PC or laptop. Save the recording and re-record the reader reading each term to monitor progress.

Teaching fluency

Two aspects of reading fluency are associated with improving reading comprehension: The first is automaticity in word recognition – a reader's ability

to decode and recognise words accurately and effortlessly and this frees up attention for the more important task of comprehension. The second is prosody (expression) in oral reading – when readers make meaning with their voices by knowing when to pause, raise voice or emphasise particular words.

Model fluent expressive reading for readers. Occasionally teachers should read too quickly, too slowly or in a monotone. Ask readers for their opinions on how such raising or lowering of voice and pausing can affect meaning.

Phrase words in meaningful groups: Disfluent reading is often staccato/ word by word/ and does not attend/ to phrase and sentence boundaries//. Brief texts can be formatted/ or marked/ to demonstrate graphically/ the location of phrases. A second approach to teaching phrasing is to teach high frequency words in phrases.

Use some of the many varieties of *assisted reading*:
Paired reading is a reading activity where a reader and a skilled reader read a text together. They follow an established pattern to allow the reader to take over reading in sections where they feel confident. The skilled reader can be a peer or an adult.

Recorded assisted reading is a solitary reading activity (with headphones and CD player/tape recorder) where a reader reads along with a passage which has been recorded by a fluent reader.

Echo reading is a reading activity in which an adult or peer reads a short section (or full text) and readers echo the section by reading the same passage with or perhaps without the original reader.

Practise reading wide and deep: Reading a wide variety of texts is practice for reading, but deep practice refers to practising on the same piece of text. Re-reading the same text improves fluency, comprehension and word recognition. Choral reading to practice text can be more acceptable to older struggling readers than individual repeated oral reading. The whole group read text aloud together using an overhead projector, or a big screen. This can be a spontaneous activity as readers find raps, songs and football chants/anthems on YouTube with lyrics. (Rasinski and Samuels, 2011)

You'll Never Walk Alone

When you walk through a storm
Hold your head up high
And don't be afraid of the dark
At the end of the storm
There's a golden star (sky)
And the sweet silver song of a lark...

Key area – Phonological awareness
Assessing phonological awareness
Teachers can assess phonological awareness using commercially produced tests or by listening to readers as they decode and blend sounds. Assessing

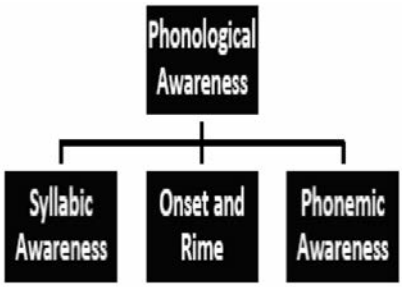

Fig. 3. Phonological Awareness (ICEPE, 2012)

phonological awareness means observing whether a reader has got "a good ear for sound": Can a reader recognise a word from the correct phonemes e.g. recognise the word *ship* when they hear (not see) the individual phonemes /sh/ /i/ /p/? Can a reader produce a rhyming word when requested, or can they break a long word up into its component syllables? The bullet points in the next section can be used as an assessment hierarchy. A cautionary note here is that sometimes a reader may be phonologically aware but may have difficulty blending phonemes because they vocalise the last phoneme in a word too loudly. Encourage readers to say the last phoneme/syllable softly when blending sounds.

Teaching phonological awareness

Becoming phonologically aware can be an enjoyable activity for readers as it does not involve reading. It involves getting readers to isolate sounds in words; blend sounds; segment words into individual sounds; and manipulate sounds by adding, dropping, or substituting sounds. Phonological awareness teaching is most effective with young children (Kamil, 2003) but it is also recommended for older struggling readers (NIL, 2007). Teachers can teach phonological awareness without buying a programme by simply following the bullet points below as oral activities. Readers need lots of practice so that they can eventually master the steps almost without thinking. Commercial programmes are available and are useful for providing a structure and system for teaching phonological awareness.

- ***Differentiate words*** – e.g. name the first / middle / last word in the following list: drum, gate, book.
- ***Differentiate syllables*** e.g. what is the first / second / third syllable in the word
  trans – form – ers?
- ***Differentiate phonemes*** e.g. what is the first / middle / last sound in the word
  dog?
- ***Add / remove letters from words*** e.g. *spoon* without *sp* becomes *oon*
- Eventually tackle ***spoonerisms*** e.g. changing *happy cat* to *cappy hat*.

Key Area – Phonics (decoding, blending, sounds, syllables)

Assessing phonic skills

There are debates about the value of focusing literacy skills at letter and word level for older readers as it can negate the idea that reading is a complex mental and social activity (Greenleaf, Schoenbach, Cziko and Mueller, 2001). However, some older readers who have difficulty reading need decoding instruction (Boardman, et al, 2008, Scamacca et al, 2007). Teachers need to have a good knowledge of phonic rules in order to assess and to teach phonic skills. One way of assessing and keeping track of a reader's progress in phonics is to prepare two copies of a text, one from which the reader reads and one on which you note and date their strengths and weaknesses. Teachers observe and record letter combinations that are proving difficult for individual readers and then teach those points in guided practice using a text that is motivating to the reader. Difficult letter combinations or phonic facts need to be revisited often, until the reader no longer needs guidance. Individual reader progress can be monitored on a personalised list of phonic targets which can be devised from a list (click here) and from teacher observations of a reader's needs.

Teaching phonics

Some readers understandably think that phonic drills are boring and childish. However, some readers have real gaps in their phonic knowledge that need to be filled if they are to become independent readers. There is a place for explicit teaching of phonic points to whole groups e.g. on a PowerPoint or in a game, but individual phonic gaps can be filled *without drills* by finding teaching moments within guided practice on meaningful, motivating, authentic and real text. The word *try* for example**,** which occurs frequently in writing or reading activities, may provide a teaching moment for either the /ie/ sound or the three sounds of the letter *y***.** English words can be irregular and the same letter can have different sounds or no sound depending on the word. This means that readers need to be aware of all of the sounds associated with a letter. A common mistake made by struggling readers is the generalisation of the *1-1 letter-sound* correspondence – which works in most Consonant, Vowel, Consonant (CVC) words – to longer words, where it might not work. For example, the three letters of the word *cat* make the three sounds /c/ /a/ /t/ but the three letters *igh* in the word *night* make just make one long sound / /**.**

Teaching syllables

Readers need to know just two main syllabication rules:

1. When there are two consonants between two vowels (VCCV), the syllables are usually divided between the two consonants (VC-CV) e.g. *nap-kin*, *ham-mer*. Note: consonant digraphs are not separated (*sh*, *th*, *ph*, *ch*)

2. When one consonant comes between two vowels, (VCV), the syllables are usually divided after the first vowel before the consonant (V-CV) e.g. *mu-sic* and *ro-bot*.

(Rief and Stern, 2011)

Key Area – Sight vocabulary

Assessing sight vocabulary

Many high frequency words (*do, what, this*, *where*) have irregular spelling patterns so sounding out these words can be pointless and frustrating. Automatic recognition of high frequency words, also called having a sight vocabulary, helps readers to improve fluency, make use of context clues and focus more on comprehension than on decoding. The Dolch list consists of the most common words in English texts, comprising 220 high frequency words. If a reader can recognise these words they will be able to read approximately half of the words they are likely to meet.

In order to assess sight vocabulary, teachers need to find time to record the words that a reader does/does not automatically recognise from the Dolch list or from authentic texts in guided reading practice. Readers can record target words in a personalised dictionary (on paper or on computer). If the Dolch list is automatically recognised teachers and readers can target Dolch Phrases, the Social Sight vocabulary, irregular words and words such as days of the week and the months of the year.

Teaching sight vocabulary

- Work on increasing *oral vocabulary* – knowing what a word means helps recognition.
- Provide frequent exposure to *target words* in group and individual guided reading in real texts
- *Work on words* that confuse particular readers *individually*
- Ensure each reader has a copy of *their own list* of target words
- *Display words* that are confusing to many readers prominently on walls
- *Write group poems* that focus on sight words
- *Preview new words* that readers will meet in reading that are not decodable (such as *island*, *rough*, *sapphire*).
- *Complete unfinished sentences* from a list of sight words
- *Teach new irregular words* by comparing them with similar words e.g. *is / his*; *bought / brought / fought*
- *Examine sight words* to see which parts are tricky e.g. the ***gh*** in *though* and ***w*** in *two.*
- The study of word parts helps develop **phonic and spelling skills** as well as sight vocabulary. Look at **roots, suffixes** and **prefixes, apostrophes** and **derivatives**. Draw readers' attention to what happens when, for example -y, -ing**,** -er are added to a word such as jump.

(Adapted from Rief and Stern, 2010)

RESOURCES

Log on to ***http://www.alinet.eu/index.php?option=com_content&view=article&id=28&Itemid=34*** to read the executive summary of the Adore project (2009). It is all about good instructional practices with a focus on adolescent struggling readers.

Log on to *http://ec.europa.eu/education/literacy/what-eu/high-level-group/documents/literacy-report.pdf* to read the final report of the EU high level group on literacy (2012) (Adolescent section 4.3, page 71)

Access support and professional development by joining or just visiting the following:

www.reading.ie click on newsletter tips and publications

www.ilsa.ie click on links and hand outs

www.nbss.ie click on resources

www.pdst.ie sign up for newsletter

www.iatse.ie click on literacy resources

www.icepe.co.uk online professional development courses

COMPREHENSION RESOURCES

www.reading.ie

www.readinglady.com

www.interventionsforliteracy.org.uk/

Question Answer Relationship

KWL Charts

54321 and 321 Summarising

Get the Gist

Somebody Wanted But So

Exit Entry Slips

Summarising Maps and Organisers

POSSE Strategy

Log on to *http://www.nbss.ie/sites/default/files/publications/web_tools_for_learning_and_literacy.pdf* to find out about using web tools to enhance literacy skills and *http://teachersmentor.com/readingk3/using_poetry.html* for ideas on teaching reading through poetry.

A book resource for teaching comprehension strategies: *Building Bridges of Understanding* by Courtney A. and Gleeson M (2007). The Simpsons feature in this publication which comes with a CD. The book recommendations are categorised in primary school classes.

Log on to *http://reading.ie/sites/default/files/documents/Newsletters/RAINews AUT10.pdf* for an article about using graphic novels with older readers (*Worth a Thousand Words)* and *http://www.englishsoftware.com.au/esl/issues.htm* for information about *Issues in English* – a computer programme to improve literacy and language skills.

Log on to *http://www.education.ie/en/Publications/Media-Library/Literacy-Resources/NEPS-Resources.html* to read about interventions for struggling readers (NEPS 2013).

Sites and books for teaching phonological awareness and phonics:

Sound Linkage resource for phonological awareness by P.J. Hatcher (2001)

The following link is a comprehensive phonic programme: *http://education.staffordshire.gov.uk/NR/rdonlyres/C08D3702-5BB8-4675-AAA1-30CFC4769AE1/162496/KS3Phonics.pdf*

Grasp Guided Reading and Spelling Patterns for adolescents and adults with specific language difficulties including Dyslexia (available from Co Galway VEC 091 874542) by Kate McMahon (2012)

Alpha to Omega Pack by B. Hornsby, F. Shear and J. Pool (2006)

Reading Reflex by C. and G. McGuinness (1998)

Toe by Toe by K. and H. Cowling (1993)

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Handheld Devices – Improving the Experience of First Year in Post Primary

Diarmuid Mooney

This paper looks at how handheld devices can be applied to improving the experience of students in first year post primary. With this transition being one of the most important elements of a child's education, there is a lot of emphasis being put in place by schools to ensure this is a seamless transition. The experience a student has in the first few weeks of first year will determine the attitude of the student towards school for the rest of first year.

Coláiste Chathail Naofa (C.C.N.), a co-educational, DEIS VEC secondary school in County Waterford introduced iPads to first year students as their textbooks. The school wanted to see whether the iPad could be used to not only enhance the transition experience of their first years' entrants but also to improve the general experience of a student in first year. They decided to utilise the amount of applications that can be installed on the iPad not only to develop the students' skills to aid them in the transition into post primary but also to help them develop autonomy over the course of first year.

In 2004 the Economical and Social Research Institute (E.S.R.I.) published a report for the National Council for Curriculum and Assessment (N.C.C.A.) called *'Moving Up: The Experiences of First Year Students in Post Primary Education'*. This study looked into the experiences of first year students in post primary education and investigated the importance of the transition for first year students. Their report found that:

> Difficulties during the transfer from primary to post primary school can contribute to the later educational failure
>
> (Smyth et al. 2004)

'*Box of Ideas*' a website designed by the Dyscovery Centre, University of Wales also spoke of how difficult the transition processes into secondary school can affect the child:

> Secondary schools are places of change. This causes additional strains on the child who is also trying to cope with his underlying difficulties and now has more problems layered on top. This can result in a breakdown in the

> child's mechanisms for coping and is why we sometimes see secondary school being a crisis time, after the child has seemingly being able to cope in primary school.
>
> (Box of Ideas 2010)

The transition from primary school into secondary school is one of the most crucial stages in a child's education and can be often a difficult time. Schools have put various programmes in place to help the transition into their school such as visiting primary schools, transfer day, a student welcoming pack, N.E.P.S. transfer profile, mentoring groups, etc. In C.C.N., the school introduced hand held devices in the form of iPads to their incoming first years in September 2012. Along with these devices being the students' textbooks the school focused on making the iPads an aid in improving the students' transition into the school.

Workshops were setup for the parents, to not only to train them on using these iPads, but also to discuss what they felt would be their children's biggest challenge in starting in the school. Once we had identified the major challenges, the parents were asked to rank which they thought were the three main challenges. 90% of the parents ranked the following as their top three:

- Their child not being organised enough
- Bullying
- Struggling with the school work/workload

The results of our workshop echoed that of the findings of Patsy Sweeney (2006) during his presentation on the 'Transition from primary to post primary' during the School Development Planning Initiative's (S.D.P.I.) summer school. He spoke on the "fear factor" and how schools need to remove this to ensure students have a positive transition experience. Coláiste Chathail Naofa decided on making the iPads their tool in removing the fear factor. To ensure the findings of the workshop were accurate, the school sent a survey to ten other principals to see what they felt were the challenges they encountered in their school. The results of the survey corresponded with that of Coláiste Chathail Naofa with nine out of ten schools choosing bullying, organisation and the workload as their top three challenges.

With all hand held devices there is the option to install various application or programs onto the device – these are more commonly known as 'apps'. C.C.N. deployed the iPads on a one-to-one basis meaning each student had their own individual iPad. This allowed the school to explore how the iPads apps could help the transition for the students.

Organisation skills of the child

In primary school the children were used to being in one classroom and having all their equipment with them at all times. Once they begin secondary school the onus is now on the child to have the correct books for classes, to know what classroom to go to next, and what books to bring home. Each iPad was installed with a timetable app called '*Handy Timetable'* which allows students to generate their individual timetable for the week. The app allowed each subject to be entered throughout the week with the room number. Once completed the app generated a colour for that subject for example English = Red, Irish = Green. The students then marked any copy books, hardbacks, folders related to that subject with the same colour sticker that the app generated. When students need to go to their lockers, they now identify their equipment with the coloured stickers. The feedback from teachers is that the time now spent at lockers has been dramatically reduced and the issue of wrong/missing equipment is not as much of a factor. A particular student was asked how he finds using the timetable app. His response was:

> "The timetable app has really helped me sort out my schoolbag. I just go to my locker, check my iPad to see what I need and just pull out the copies with that day's colours on them"

Bullying/Cyber Bullying

A major concern of the parents was bullying and how their child would be protected from cyber bullying when they now are using a device that is connected to the internet. The iPads form of internet browser was removed and replaced with a browsing app called '*K-9 Browser*'. This app not only restricted the students to what they could access online in school, it also restricted them when using the internet at home. Each student was assigned with a school email address which was synced to the iPad administrators email account. This meant that if malicious emails were sent by a student, even if deleted off their device, were stored on the administrators device. Parents were also trained on how to check the devices for any bullying activity, as recommended by Sweeney (2006) that the best way to help with the issue of bullying is to "have the parents inform the school of any concerns students may have e.g. bullying".

Students now have access to the teachers' school email addresses, and teachers feel that students are now more forthcoming in contacting them by email with any concerns or issues they may have. One teacher commented:

> "I think the fact students have the option to email a teacher removes that fear of having to speak face to face. Another factor is that emailing is more discreet and somebody is more likely to come forward if they feel safe in telling you something"

Struggling with school work/workload

Managing workload is a skill that develops the onus being on the student to manage their workload and being a first year this is not a skill they have honed yet. Every iPad comes with a calendar automatically installed. The students enter any due dates of projects or even their homework into a date. The iPad will then automatically send them a reminder a day before this is due. This is an effective way to eliminate the "I forgot it was due today" excuse but all this app does is to remind the students of their work deadlines. To give help in completing work the school decided on using a virtual classroom app called '*Edmodo*' which students could access in both school and at home. A number of teachers were selected who would be comfortable in piloting this virtual app in their subject, to see if it would help the students when doing homework. Edmodo is a form of cloud computing where teachers can upload notes, summaries and sample answers for students to access. One of the teachers who piloted Edmodo in his subject commented on how the quality of answers has improved:

> "The standard of work is improving. Students are now making the effort in reading what I put up on Edmodo and are using the material in their homework. Parents are also reading the notes in order to help their son or daughter with their homework and it's enticing parents to get more involved in homework"

Moving away from the apps that can be installed, the way classes are now being conducted is changing. In the '*Moving up'* (2004) report, Smyth et al. talked about how there is a need for teachers to take a different approach when teaching first years:

> Some post-primary teachers report that they take a different approach to teaching first year students than students in other years...Generally, however, teachers tend to stick to the traditional approach

The fact students of C.C.N. now have the internet at the touch of a button, classes which were predominantly student centred are now developing into self directed learning. Students are now pushing themselves in classes because they have infinite resources for any subject through one device. Teachers feel that the main reason the iPads have been a huge success for the first years is because they are now challenging themselves to use the iPad for research in various subjects. The fact the students are using the iPads continuously makes the apps previously mentioned more likely to succeed in aiding the transition into the school for the students.

Even though throughout the course of first year, students levels of numeracy and literacy improved, Smyth et al. (2004) found "that the majority of first year students' test scores in reading and mathematics do not improve over the course

of first year". In C.C.N. the mathematics results have improved since the students were assessed in the beginning of the school term. The new project maths has been defined as "to provide for an enhanced student learning...emphasis will be placed on students understanding mathematical concepts" projectmaths.com (2013). The maths teachers commented that the iPads have enabled them to create an environment where they now can focus their lessons without the restraints of the old text books. Morrone et al. (2012) talked about how the iPads help create an active learning environment; "iPads were found to increase student engagement by providing innovative and creative learning environments" which is an ideal environment for project maths. Reports such as "*Moving Up*" by Smyth et al. (2004) and "*Negotiating the Transition from Primary to Post Primary School*" by Zeedyk et al. (2003) have indicated that educational failure results from an unsuccessful transition into post primary. Due to the iPads creating a successful transition, classes such as mathematics that tend to be challenging for a first year student are now flourishing. The fact the devices have access to the internet, allows the students and teachers to broaden resources and adds a depth to classes that before may only be achieved if a class room had access to computers or laptops.

C.C.N. has an impressive reputation in working with students who have special educational needs and uses a number of programmes to aid students with special needs. The school already uses software such as *'read write gold'* on the laptops for students who may be struggling with reading but have only scratched the surface when using apps for students with special education needs. In 2011 the National Council for Special Education (N.C.S.E.) composed an information booklet for parents who have children with special needs. In this booklet they mentioned that:

> The transition from primary to post-primary school can be challenging. Pupils have to cope with having more teachers, more subjects, more books, and often bigger numbers of peers and bigger buildings. They have to learn how to use their timetables, how to find their way around different classes, how to organise their books and lockers. Some pupils with special educational needs may need additional support in making this change.

Apps such as 'Handy Timetable" and the "Calendar App" will act as an extra support for students with special education needs as well outside the classroom, whereas in the classroom apps such as "Voice Dream" will be an extra aid for students with a learning disability or Sensory Impairments. The app allows students to view PDF files in different font sizes, it will define words for students, it will read the PDF to the students at different speeds, etc. O'Dwyer (2010) wrote "For students of all different varying disabilities technology often provides them with a way to keep up in class". The apps will help the students stay positive about their own abilities without being isolated for using

something different to the rest of the class. The beauty of a handheld device compared to a laptop is the flexibility that comes with the likes of an iPad. It can be adapted to any student's needs by adjusting what apps are installed to the device. The thirty-one schools which adopted the laptop initiative in 2000 found the project to be a huge success in supporting students with learning difficulties. Schools with iPads can adapt the principles of this initiative to further support struggling students.

The "*Moving Up*" report also looked into the attitudes of first year students, they found:

> At the beginning of first year, students are generally positive about school and their teachers. By the end of the year, however, they are somewhat less likely to find school interesting; they have a less positive attitude to school and to teachers. They are also less positive about their own academic abilities.
>
> (Smyth et al. 2004)

In October 2012, Coláiste Chathail Naofa surveyed the attitudes of their first year students towards their school work. The results were unanimous; all the students were happy in school and enjoyed the majority of their classes. The same survey was given to the students six months later. Unlike the findings of Smyth et al. (2004), the majority of students reported they were as happy as they were when they started first year, only 2% of the students reporting a decline in their attitude towards school. One of the questions in the survey asked 'what is helping you the most in school?' – 95% of the students mentioned the iPad as a factor. Smyth et al. followed up the research to the 'Moving Up' with another report for the N.C.C.A. called '*Pathways through the Junior Cycle: the experiences of second year students*'. In this report they found that the "proportion of students who find schoolwork interesting falls from 80% at the start of first year to a low of 55% by the end of second year" (Smyth et al. 2006). Second year students of C.C.N. were given the same survey as that of the first years – the results followed the similar trend of Smyth et al. findings. With the success of the iPads in retaining the positivity of the first years towards the end of the school year, the hope is that the success of the iPads continues with the first years into second year to break the pattern of falling interest in schoolwork.

To date the iPads have been an instrumental factor in C.C.N. in improving the transition for their first year students. The quantity of apps that can be implemented within a classroom is immense. Technology such as iPads is now second nature to the youth of today and if used to its full potential, it can bridge the gap between primary and post primary that challenges students. Even though technology such as iPads is a new concept to education, the principles are that of the same of the tried and tested methods just integrated with modern

technology. Handheld devices can be implemented alongside existing methods of transitioning and they will merge successfully. Due to the supremacy and intelligence of these machines, they can provide the students with endless support through the touch of a button and be a standalone initiative to help students move from primary school to secondary school. Once the students become comfortable in using the device, the iPad will continue to aid the student throughout their first year of post primary.

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Differentiated spelling instruction using co-teaching

Thérèse Mariè Vahey

Introduction

Spelling is a complex skill, with spellers developing at varying rates (Gentry, 1982). Incidences of poor spelling are widely documented, with particular reference made to the issue of spellers producing spellings accurately in spelling tests, only for them to be forgotten or reproduced incorrectly in written contexts (Culligan, 2009; Fresch, 2007; Chase-Lockwood and Masino, 2002). Whilst the importance of spelling has been widely debated in recent years, research has shown that improvements in modern technology have not reduced the necessity to acquire spelling skills (Viadero, 2002).

This study focused on how educators can improve the problem of poor spelling by enhancing the methods by which it is taught. The research aimed to ascertain the potential, differentiated spelling instruction holds, for improving the teaching and learning of spelling as a whole class approach (Vahey, 2012). Differentiated spelling instruction as a whole class approach using co-teaching may reduce the existence of two separate programmes, one in class and one in the Learning Support Resource Room, as well as increasing teachers' knowledge of spelling instruction.

The importance of spelling

In essence, spelling involves a 'study of the word' (Moats, 2000, p.86) requiring individuals to apply their linguistic skills as they write in order to become proficient spellers. Some U.S educators believe that spelling is the most poorly taught subject and requires more direct instruction (Darch et al., 2006). Ramsden (1993) highlights that spelling has never really been taught only corrected and tested. Misconceptions circulated, leading to the belief that spelling was learned informally. Therefore, it was a skill which was caught rather that taught (Graham, 2000; Groff, 1996). Traditional instruction has involved the repetitious copying of words or the memorisation of word lists (Alderman and Green, 2011; Culligan, 2009; Kelman and Apel, 2004). This does not promote active, reflective thought about language and contradicts the belief that spelling is a linguistic skill.

For students with learning difficulties (LD) spelling is often a challenging task that is viewed as best avoided (Bos and Vaughan, 2006; Berninger, 2000; Graham, 1999). Evidence of this complexity is evident in the analysis of a child's written work. Thus, it is critical to help students develop spelling skills to meet their academic, vocational and social needs. In order to help children with LD improve their spelling it is necessary to know which spelling areas pose difficulties, and then tailor instruction around those weaknesses (Darch et al., 2000). It is important to note that improved spelling may positively impact on a student's motivation to communicate through writing, as their writing will become more recognisable to others. Calhoon et al. (2010) recognises that effective instruction is driven by explicit assessment of a child's strengths and weaknesses. It is only by looking at the types of words students get wrong and errors they make can one decide how to tailor appropriate spelling instruction (Joshi, 2003; Masterson and Apel, 2000).

Aims

The following are the research questions which formed the basis and rationale of the study:

- Is differentiated spelling an effective teaching model for all children?
- Can explicit instruction in spelling impact on their mastery of spelling?
- Is co-teaching effective for promoting children's spelling?
- Can pupils receive differentiated spelling instruction in the mainstream primary classroom?

Methodology

Action Research was deemed an appropriate methodology because it is practical and problem solving by nature (Bell, 1999; Calvert and Lightfoot, 2002). It allowed the researcher to plan, act, observe and then reflect on the implications of differentiated spelling instruction using co-teaching for future practice based on the findings. Furthermore, it helped bridge the gap between theory and practise (McKernan, 1993) and allowed for the dual role of teachers as researcher (McNiff et al., 1996).

Both qualitative and quantitative methods were used to collect and analyse the findings. The Single Word Spelling Test (Sacre and Masterson, 2000) was administered at the pre and post stages of the intervention. The scores were compared against each other and allowed for clear comparisons to be drawn, as to the progress made in the interim period. Questionnaires were distributed to the participants, pre and post research, to evaluate pupils' perceptions and views on spelling. A written exercise, which took the form of dictated sentences, was completed by each child to ascertain each child's ability to retain spellings and accurately transfer them into a written context at the pre and post stages of the

intervention. In addition, field notes in the form of reflective journals were completed by the teachers involved.

Participants

The action research was implemented with a multi-class group of third and fourth class. There were twenty three pupils in the class, six of whom receive learning support. Two teachers were involved in the study, the Learning Support Resource teacher (LSRT) and class teacher.

The group was selected for convenience, as the children receiving Learning Support needed particular help in the area of spelling and it formed the basis of their Individual Education Programme (IEP) and Long Term Programmes of Work.

Grouping the Sample

Children were assigned into four groups based on their ability, needs, developmental stage of spelling, self-esteem and results from the Single Word Spelling Test (SWST, Sacre and Masterson, 2000).

Each teacher had responsibility for two groups. The LSRT worked with the groups that contained children who attended Learning Support. Table 1 shows the groups that were formed:

Table 1: Grouping the pupils

Group 1	➢ Moderately low average – average ability spelling group. ➢ Phonetic – transitional stage of spelling development. ➢ All 3rd class pupils.
Group 2	➢ Average ability spelling group. ➢ Transitional – Conventional stage of spelling development. ➢ All 3rd class pupils
Group 3	➢ Average ability spelling group. ➢ Phonetic – Transitional stage of spelling development. ➢ All 4th class pupils.
Group 4	➢ Average – moderately high average ability group. ➢ Conventional stage of spelling development. ➢ 3rd & 4th class pupils

Duration and Frequency
The intervention was implemented for a period of six weeks. Three sessions of differentiated spelling instruction took place per week for thirty minutes. Each group received fifteen minutes of instruction from either the class teacher or LSRT and also worked independently for fifteen minutes based on the spelling rule or pattern being covered that week.

Procedure
The instruction phase centred on two tasks, working on spelling words and dictation exercises. Both tasks were based on the needs of the group and were aimed at their instructional level.

When working on the spelling words, children stretched, segmented and broke words into syllables before writing them. Elkonin Boxes (Hatcher, 2000) were used with two groups to facilitate analysis of the spoken word and its components.

Dictation exercises were based on Culligan's core words (Culligan, 2009; Culligan, 1997) and the previous weeks spelling rules or patterns.

Pupils self-corrected their spelling and dictation. This method of correction was chosen as it has been proven successful for improving the spelling performance of students (Viel-Ruma et al., 2007; Alber and Walshe, 2004).

All pupils were instructed in the Look Say Cover Write Check (LSCWC) strategy as advocated by Peters (1985). This approach was chosen as it is multi-sensory. A multi-sensory approach to spelling instruction is strongly advocated by research (Alderman & Green, 2011; Masterson & Apel, 2006; Wanzek et al., 2006). It also facilitates all learning styles.

This strategy was used to independently work on any words they found challenging.

Findings
The collection of data from spelling tests, children's questionnaires and written tasks were analysed to assess the interventions effectiveness on spelling improvement. The following results provide a summary on the students' scores and opinions.

Spelling Test
The results of the pre-intervention spelling test established a baseline for each pupil and assigned them to an appropriate group. The SWST was re-administered following the completion of the spelling intervention. The table which follows shows the average improvements made by each group.

Table 2: Single Word Spelling Test average improvements made

Group	Standard Score	Percentile Rank	Improved Spelling Age
Group 1	17.4	36.6	2.09+
Group 2	18.83	34.33+	2.06+
Group 3	19.66	44.33	2.07+
Group 4	15.66	23.55+	1.03+

The impact of differentiated spelling instruction using co-teaching resulted in an average increase in standard score of seventeen for all pupils. This translated to an average improvement in spelling age of over two years and one month for the class.

Pupil Questionnaire

The initial questionnaire completed by the participants asked for their views of themselves as spellers. Words and phrases such as 'don't like, not fun, hard and boring' were evident in the open question responses. Approximately 52% (n=12) of the participants liked spelling, with 78% (n=18) confident in their abilities as spellers. However, when in doubt 39% (n=9) of the participants agreed they would choose a word they were capable of spelling.

The confidence of all participants grew immensely as a result of the six week intervention, with all of the participants, labelling themselves a good speller. In addition, all twenty three participants agreed that they *'always'* or *'sometimes'* attempted to spell new words by themselves. This increased by 17% in comparison with the pre-intervention questionnaire.

Prior to the intervention over 43% (n=10) of the pupils, felt frustrated with spelling. This decreased by over 17% during the interim period. As a result, the differentiated spelling instruction improved the children's confidence in their spelling abilities.

Prior to the intervention it was clear that the children lacked a clear strategy to learn spelling (Figure 1). However, the instruction they received during the six weeks enabled the children to apply strategies to their spelling. It is clear from Figure 2 that 74% (n=17) of children now use the Look, Say, Cover, Write, Check approach when learning spelling.

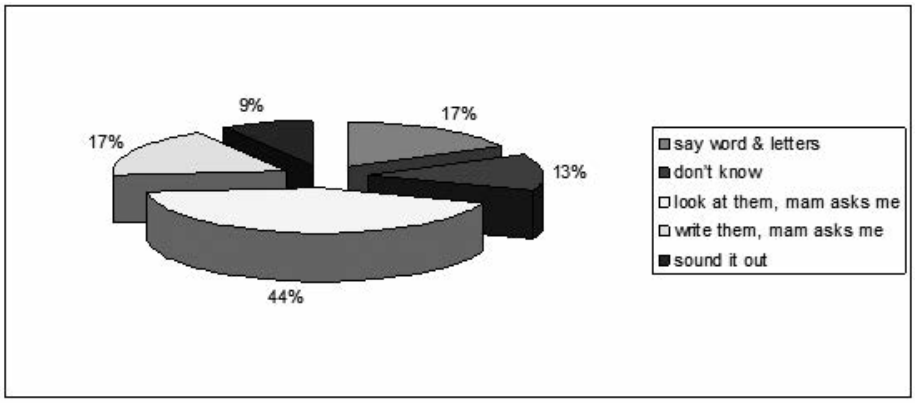


Figure 1: Strategies used pre-intervention

Written Exercise

The written exercises allowed for the improvement of the transfer of spelling into pupils written work to be monitored. The pre-established baseline of errors was compared to the overall average of the written tasks for each group. The results are as follows:

Table 3: Comparison of average errors pre and post intervention

Average Number of Errors			
Student	**Pre Intervention Errors/85**	**Post Intervention Errors/85**	**Average Overall Improvement**
Group 1	10.8	4.2	61.816%
Group 2	6	1.66	63.65%
Group 3	7.7	1.33	83.9%
Group 4	3	0.666	75.85%

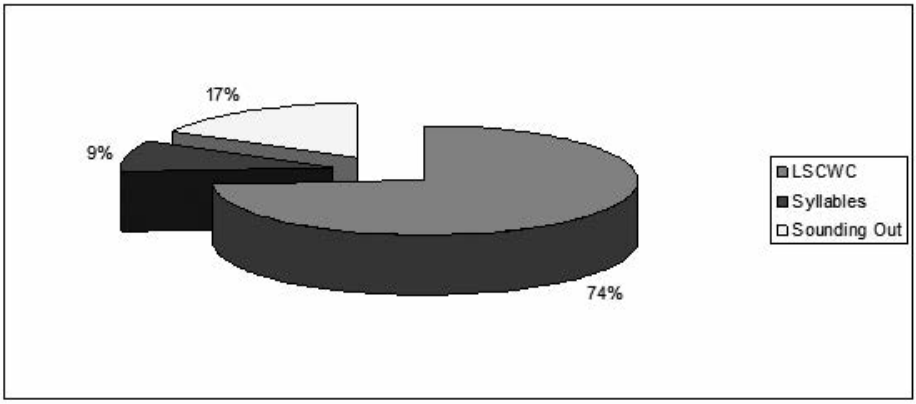
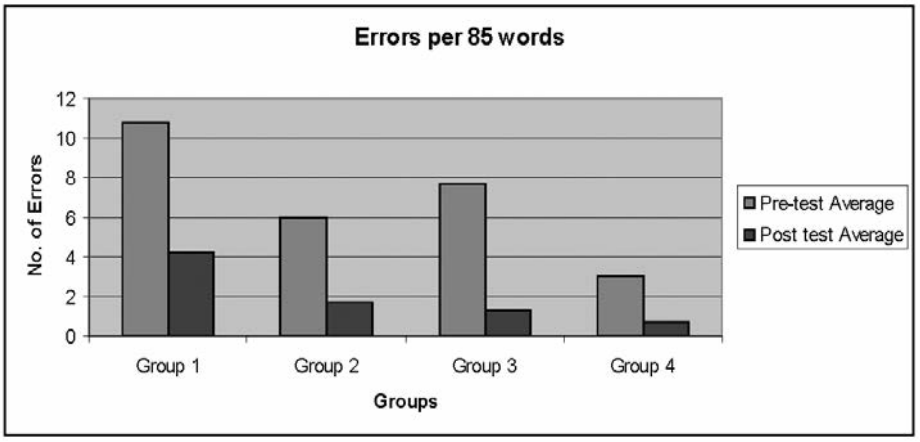


Figure 2: Strategies used post intervention

The findings above clearly highlight the positive impact differentiated spelling instruction had on spelling retention and transfer. The graph in Figure 3 is representative of the overall progress made by each group over the six week period.

Figure 3: Results of written exercise



Teacher Observations

Teacher observations noted an increase in pupils staying 'on task.' It was also observed that for children who found spelling a challenge, direct instruction at their level led to a notable improvement. One pupil commented 'spelling is exactly at my level… spelling was too easy before.' Differentiated spelling instruction challenged all pupils which led to 'a real buzz of activity at spelling time.'

Both teachers were in agreement that co-teaching allowed all pupils to gain more individual attention, instruction and guidance as a result of the reduced pupil teacher ratio.

The teachers concluded that differentiated spelling instruction using co-teaching fostered friendships, confidence and pupils' self-esteem. They were often heard saying 'wow I can't believe I can spell that' to their peers. The observations made in relation to confidence and self-esteem was also evident in the pupils own responses in the questionnaire with all pupils agreeing they had become more competent spellers.

Conclusions

Differentiated spelling instruction improves spelling ability

All children in the study made academic spelling gains as a result of the six week spelling intervention. This highlights the benefits differentiated spelling

instruction holds for all pupils, allowing their spelling needs to be met within the mainstream classroom. Furthermore, the findings highlight the benefits this strategy holds for the spelling acquisition of pupils within the moderately low average spelling ability group (Group 1). This group made the greatest gains over the intervention period with an increase of nearly three years in spelling age. This supports Foorman and Torgensen's (2001) view that grouping students according to their instructional level is critical, particularly for at risk pupils.

Direct instruction at a pupil's instructional level enabled them to apply effective strategies to their spelling with 74% (n=17) of participants using the Look, Say, Cover, Write, Check strategy. This emphasises the value of pupils being involved in their own learning and being provided with spelling strategies enables them to learn independently.

Differentiated spelling instruction improves the transfer of spelling into writing

The children involved in the action research improved their ability to retain spellings and transfer them accurately into written exercises as a result of their participation in differentiated spelling instruction.

The maximum spelling improvement was evident in the written work of Group 3. However, spelling retention scores for children of all ability levels improved as a result of differentiated spelling instruction. The research and findings of this study have indicated that differentiated spelling instruction as a whole class approach is an effective method of improving spelling retention and the transfer of spelling into written work for pupils of any ability level.

Differentiated spelling instruction promotes pupils confidence

The findings from the pupil questionnaire and teacher observations displayed a positive change in children's attitude towards spelling and the perceptions they held of themselves as spellers. A comparison of pre and post intervention questionnaire results highlighted the favourable impact the intervention had on all students spelling confidence with an average improvement of 22%.

Differentiated spelling instruction using co-teaching allowed all pupils to show their strengths. In turn, pupils showed positive self-esteem. Pupils matured as a result of being actively involved and responsible for their own learning. Furthermore, pupils themselves believed their work was better. Pupils were happy and more confident in their spelling abilities. As a result, it can be concluded that differentiated spelling instruction is successful in improving children's spelling confidence in this study.

Co-teaching has a positive impact on spelling scores, teacher relations and learning

Co-teaching allowed for differentiated spelling instruction which in turn had a positive impact on the children's retention and acquisition of spelling. In addition, co-teaching can promote teacher relations and learning. The use of co-teaching allowed for expertise in the area of spelling and spelling strategies to be shared by both teachers. Furthermore, the success of differentiated spelling using co-teaching resulted in the class teacher implementing the spelling programme within her own classroom on a long term basis.

In addition, co-teaching facilitated teacher observation of all pupils through working in smaller groups and allowed teachers to collaborate on how best to meet their needs. Moreover, the study fostered a shared responsibility for pupils with difficulty and their IEP's, with both teachers providing their skills and expertise to work with all pupils.

Recommendations

The findings of the study demonstrated the positive impact differentiated spelling instruction, through the use of co-teaching, had on spelling for children of all ability levels. All children were learning at a level which best suited their needs. However, it must be acknowledged that this was a small-scale research project and the absence of a control group and small sample size means that the validity is limited. It is recommended that this practice be extended throughout the wider school community.

This study has found that differentiation; explicit instruction and co-teaching are effective methods for teaching spelling and therefore has implications for all teachers in their regular classroom instruction. The promotion of these methodologies is crucial in enabling teachers to meet pupils individual spelling needs within the mainstream classroom. Therefore, it is recommended that teachers are provided with training in the use of differentiated spelling instruction using co-teaching as an approach in the teaching of spelling.

Summary

This study was successful in demonstrating the potential effectiveness of differentiated spelling instruction, a whole class approach, on the improvement of spelling for all ability levels in the study. The main findings form reading the literature and practical experience in this area are that carefully managed spelling interventions have the potential to improve pupils' skills and motivation. However, they do need to be evaluated carefully. Using differentiated spelling instruction by means of co-teaching to support pupils with spelling difficulties should never be overlooked and warrants further research.

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The Importance of Fine Motor Skills

Brendan Culligan

As the development of handwriting is a central part of school curriculum, this article will focus on the mechanics of handwriting and on the skills required for its development. Fine motor skills are essential for writing, for without them the child's ability to form letters quickly and efficiently may be severely affected. Factors that contribute to illegible writing are incorrect letter formations or reversals, inconsistent size and height of letters, variable slant and poor alignment, and irregular spacing between words and letters (Alston & Taylor, 1987).

The importance of developing fine motor skills before handwriting training begins, has long been emphasised in the literature. Alston & Taylor (1987) argue that children who begin formal writing instruction before they are ready may develop poor writing habits. There is also much evidence, which suggests that formal instruction in handwriting be postponed until the child can draw a vertical line, a horizontal line, a circle, a cross, a right oblique line, a square, a left oblique line, an oblique cross and a triangle. Amundson (2005) argues that 'letter formation requires the integration of the visual, motor, sensory and perceptual systems.' Teodorescu and Addy (2001) identify six main components of handwriting: legibility; spacing; letter size; slant; page alignment and formation.

Fundamental to the development of these components, regardless of whether a print or cursive style is adopted in schools, is the question of fine motor skills. These skills involve the ability to control the small muscles of the body and are usually defined as the ability to co-ordinate the action of the eyes and hands together in performing specific manipulations (hand – eye – co-ordination). Children need motor control in order to form various patterns and letter shapes, and they also need perceptual skills for letter size, spacing and orientation of letters.

Children require these hand-eye skills to develop good handwriting. It is poor handwriting that usually brings these children to teacher's attention, but it is important to remember that poorly formed letters may only be part of the problem. These children may be poor writers because of an underlying motor difficulty or they may be experiencing difficulties with posture, positioning / steadying the paper, or with pencil pressure. Developing good posture for writing is as important as a correct pencil grip. As children spend a considerable

amount of their school day engaged in writing activities, poor posture may result in tiredness or shoulder/arm pain. Good posture provides trunk stability, which is essential for good mobility of the arms, wrists, hands and fingers. It may seem old fashioned but, ideally children should be seated with both feet on the floor at a table that is neither too high nor too low as this could affect pencil pressure. The non-writing arm/hand should be steadying the paper and also bearing some body weight.

It has been the tradition in the Irish educational system that fine motor activities are introduced in an informal manner during the early morning classroom play/activity time. Throughout this activity/play period, children are usually grouped and given different activities. These activities are usually rotated on a daily basis so that each child may experience a variety of activities in the course of the school week. However, while the children are actively engaged in these activities, the teacher may also be occupied with other tasks (for example, correcting work or listening to a child's reading). This may result in very little direct observation of children's fine motor manipulation/development. Such an approach may be satisfactory if the child has the ability to automatically develop and perform fine motor tasks. However, the reality in classrooms is that for many children this informal approach is not sufficient for the development of these skills. The importance of the teacher's role in the early identification of children with fine motor, pencil grip, spacing, or possible reversal difficulties cannot be overstated. Until such time that a child has developed satisfactory fine motor skills, I believe s/he should not be introduced to formal handwriting worksheets/books.

The Revised Curriculum (1999) overlooks the whole area of fine motor skills. Perhaps this was an oversight or an assumption that by adhering to traditional practices, these skills will be automatically acquired. The closest it gets to fine motor skills is when it states (page 78) that

> 'the teaching of letter formations will be done as one of a number of activities that a child must practice (*sic*) in order to begin writing.'

Unfortunately, it neither defines nor proposes what these activities should be. Without guidance as to how children may perfect these areas of development, it is most likely that the traditional random approach to fine motor activities will continue, denying the opportunity for proper evaluation of progressive development. Landy and Burridge (1999) stress that young children 'need to practise visual-motor skills and develop kinaesthetic and tactile awareness.' Just as is the case with gross motor skills (involving large muscle movements such as crawling, walking, running, jumping, swinging, throwing, kicking, skipping, etc.), fine motor skills do not develop at the same pace for each child. Sometimes these skills develop rapidly and at other times very slowly. It is common for many

children to experience difficulty with certain fine motor skills, but if these skills are considerably underdeveloped on school entry, then specialist assistance may be required. It is crucial that teachers need to model these skills/movements and provide daily opportunities for children to experiment and practise them.

One of the most significant fine motor milestones is the pincer grip – the ability to lift and hold objects between the thumb and index finger. This indicates that the child has moved away from the palmar grip – holding an object (for example, a baby's rattle) in the palm and wrapping fingers around it. In the literature, some experts state that children are able to form a pincer grip from as early as nine months. Others will argue that it is between the ages of twelve and fifteen months that such a grip develops. When the child reaches the toddler stage, manoeuvring objects becomes more advanced to include twisting, pulling, pushing, turning and using writing implements to produce scribbles.

To improve a child's fine motor skills is certainly more complicated than developing gross motor skills and does necessitate preparation, time and a variety of activities. It is possible to find children with a weakness in one or both gross/fine motor areas. A child who may be skilled at sporting activities may not possess the fine motor skills to write neatly. A child who possesses good artistic expression may not have the skills (or interest) to be involved in games in the schoolyard or sports field. It may also be argued that fine motor skills can be broken down further into skills needed to draw a picture and skills needed to write letters/numbers. Many children who state that they 'don't like drawing' or 'don't like writing' may be the very ones who find carrying out certain fine motor tasks quite difficult or frustrating.

By the age of four, most children will have developed a clear hand preference or dominance. The dominant hand develops expertise in performing tasks while the non dominant hand assists, e.g. cutting paper with a scissors. However, just as there are some children who may not have reached this stage there are others who may be quite proficient using both hands (ambidextrous). For the classroom teacher a greater cause of concern than hand dominance is the difficulty children experience with the development of their pencil grip. The Revised Curriculum (1999) states that

> 'from their earliest school experience, children should be encouraged to learn to grip the pencil appropriately.'

Although the word 'appropriately' is undefined, I assume that it refers to the tripod grip, which involves holding a pencil with the index finger, thumb and middle finger. According to Levine (1987)

> 'in order to hold a pencil effectively and produce legible handwriting at an acceptable rate, the fingers must hold the writing tool in such a

> way that some fingers are responsible for stabilising the tool and others for mobilising it. In a normal tripod grip, the index finger is responsible for stabilising the tool and the thumb and middle finger are responsible for mobilising the tool during writing.'

Many children enter our educational system without such a pencil (tripod) grip. These children may come to school with faulty habits perhaps picked up in the home, in the crèche or playschool. Research clearly indicates the importance of a correct pencil grip to allow the fine movements necessary for writing. The longer children use a faulty pencil grip, the more it becomes habitual and more difficult to correct. For older children, poor pencil grip impacts when the volume of writing increases. It usually leads to fatigue as well as slow/poor letter formation. If the child has not acquired a tripod grip, then activities/ opportunities will have to be provided for its development. If these activities/ opportunities have been afforded to the child and s/he still experiences difficulty with the correct grip, then as mentioned above, specialist assistance may be required from an occupational therapist.

A common and traditional occurrence in schools sees children with underdeveloped fine motor skills using 'chubby' crayons, pencils or paintbrushes. In such instances, the immature/underdeveloped tripod grip may have to be 'reinforced' with the ring finger and perhaps the small finger also. Having children with underdeveloped fine motor skills use heavier writing/painting implements they cannot manipulate, could exacerbate the problem. Lamme (2000) suggests that there is no real advantage in giving children such 'chubby' writing implements. It is fundamental that children be presented with writing instruments that they *are* able to manage. Once a teacher is satisfied that the child's fine motor skills are developing, the child should be given a 'normal' slim pencil to use. A short (golf size) slim triangular pencil is most suitable as it fits 'snugly' into the tripod grip. Another advantage of using a slim pencil is that the child will not have to change to different size writing implements, as s/he gets older. If there is to be a methodical development of fine motor skills children must be given opportunities to experiment, practise and improve new movements. Landy and Burridge (1999) outline a sequential order of pencil activities, namely; *scribbling, colouring, channelling, tracing* and *copying*. They define channelling as drawing a line between two guiding lines and assert that it is a prerequisite to tracing activities.

Activities to promote the development of fine motor skills

Activities to promote the development of fine motor skills are meant to be enjoyed and to relax the child. The Revised Curriculum states that 'in the junior infant class they should have plenty of experience in pre-writing, scribbling and pattern work' (p.14). As it does not elaborate on these activities, the following

list may be of use when developing a school policy on fine motor skills. Very young children have the tendency to knock objects down before building up, remove objects before inserting and pull objects apart before joining them together. These activities (see below), both bi-manual and uni-manual, are intended to assist the child to grasp, place, insert, build up, join, reach out, release and twist. They are not presented in developmental stages of difficulty, nor are they broken into the categories of grasping, manipulating or hand-eye co-ordination. In association with school policy, teachers will take the child's stage of development into consideration and select or adapt activities that will encourage rather than frustrate the child. For ease of access, the list is presented in alphabetical order and is illustrative rather than exhaustive.

Fine Motor Skills

Fine Motor Skills *without* Manipulatives

Bend and straighten fingers one at a time

Brush imaginary dust off clothes with dominant hand

Clap hands/fingertips together

Clap finger tips individually

Clap out syllables/beat

Clean imaginary window with circular movements (clockwise / anticlockwise)

Clench and open fist tightly / lightly

Clench and open fist quickly / slowly

Copy tapping/clapping movements

Cup hands together

'Cut' imaginary string using a scissors movement with index and middle finger of dominant hand

Dangle both arms limply and shake them

Dangle both arms limply but just move wrists backwards and forwards / in circles

Drum fingers individually on desktop

Fan out and then close fingers

Finger knitting

Finger tapping on table/desk each finger in turn

Finger tapping on table/desk with alternate fingers

Finger walk on flat surface

Flick each finger away from thumb

Interlock fingers to make both hands 'water-tight'

Lean on/press finger tips on table top / against wall / door

Make 'circle' (pincer) shape by joining thumb and index finger. Do the same with other hand. Now interlock both 'circles' and pull

Make stirring movement with closed fist (quickly / slowly)

Make stirring movement with open hand (quickly / slowly)

Make stirring movement with thumb, index and middle finger (quickly / slowly)

Mime the playing of various musical instruments

Open fingers of left hand and press fingers of right hand against each finger of left hand in turn.

Place dominant hand on table (palm facing downwards) and raise each finger in turn from the table

Place dominant hand on table (palm facing upwards) and raise each finger in turn to touch thumb

Place elbows on table and move hands in circular motion (clockwise / anti-clockwise)

Play imaginary piano in the air / on the table top / desk

Play imaginary violin

Play with miniature toys (tea cups, saucers, etc.)

Pretend to tear paper, cardboard

Pretend to wring out clothes

Push fingers and thumb against table (two hands – then dominant hand)

Put both arms straight over head and make scissors movement

Put on / remove imaginary gloves

Rotate thumb around each finger tip (clockwise / anticlockwise)

Rub hands together

Shake hands

Snap thumb and middle finger

Spread and close fingers (quickly / slowly)

Thumb touching the tip of each finger in turn

Thumb touching the tip of alternate fingers

Touch nose with fingers (eyes open / shut)

Turn imaginary key using thumb, index and middle fingers

Twiddle thumbs (forward and reverse motion)

Twist imaginary door knob

Use dominant hand to squeeze fingers of other hand

Use pincer grip using thumb and index finger

Use pincer grip using thumb and other fingers

'Walk' index and middle finger up and down a pencil / ruler / desktop / wall
Wiggle fingers

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An investigation into the effectiveness of a six week paired reading intervention, using cross age peer tutors, on a student's reading development

Joe O Riordan

Introduction

"Education is either part of the solution or part of the problem" (Tormey, 2003, p.1). In a society faced, as it is, with innumerable challenges the importance of education cannot be overstated. While the success of education is judged at a macro level its value is built upon how it operates at the micro level. While we may speak of the effect of education on a societal level it is at the level of the individual student that the real effect and power of education can be seen. For this reason this assignment proposes to examine the effectiveness of a paired reading scheme on a single pupil, who for the purpose of this study will be called Daniel. The reading scheme involved the pupils of fifth and sixth class working as tutors of first and second class; this study focuses on Daniel. This case study will examine the theories and studies behind paired reading and analyse this intervention's ability to improve Daniel's reading. What will be explored is not just theory or practice in isolation but a reflective combination of both in what Freire refers to as praxis, where praxis is "reflection and action upon the world in order to transform it." (1972, p. 52). This study is not a theoretical discussion nor a description of practice, rather, it is looks at the combination of both manifested as they are in the practical and reflective use of a theory. Therefore, this assignment will, using a variety of methods, outline and examine Daniels educational background prior to the intervention. Through assessment a baseline will be identified and a post intervention evaluation will examine whether Daniel has made any gains. It must be kept in mind that this research is a reciprocal process where all participants learn from each other.

Background

The school is located in rural east Galway and is under the auspices of the Catholic Church. Current enrolment is eighty five pupils, the majority of whom reside within the local community. There are six teachers based in the school; four classroom teachers, a shared learning support teacher and a shared resource teacher. 6% of students qualify for resource hours, 21% attend learning support in English and 14% receive learning support in mathematics. The school does not have any children from an ethnic minority, nor do any of the students have English as an additional language.

Reason for Selection

Daniel is a seven year old pupil in first class. He is a happy and motivated pupil who enjoys school, except when it comes to reading. Reading, both for Daniel and his parents, is an area of great concern. Daniel's reading age was a year and three months behind his chronological age and at the beginning of the year he presented with no decoding strategy. Daniel's difficulty in decoding meant his reading lacked fluency, which as Pumfrey notes, is one of the key characteristics of effective reading (1994). A fluent reader whose decoding skills are automatic will be able to concentrate more on the story thereby improving his comprehension ability (ibid). Daniel, however, read in a stop-start fashion and therefore could not follow the narrative flow of the story which in turn resulted in comprehension difficulties. These difficulties caused Daniel to develop a negative self image in relation to reading and he had a low expectation of success in any task involving reading. This low self esteem created a negative spiral in which Daniel read less and as a result fell further behind his peers which was another blow to his self efficacy. It was in an attempt to break this negative (poor-get-poorer) 'Matthew effect' (Fuchs and Fuchs, 2006) in reading and to combat Daniel's experiential deficit that he was selected for the study.

Daniel has been attending resource since 2009 as a result of a speech and language difficulty, which was diagnosed three years ago and which will be discussed in more detail in the biographical section. Daniel receives three hours thirty six minutes of support a week. In September 2011, on taking up the post in the school, I spoke to Daniel's former resource teacher and his mother (who shall be referred to as Mrs. D). Both described how Daniel did not like attending his support sessions and would become upset when he struggled with work or was corrected. Daniel and I worked well together and he began to enjoy attending these sessions. As a result of being happier in himself Daniel became eager to please his teachers and his mother and would delight in displaying his talents and receiving praise. Following on from this, and the introduction of a new reading scheme and the Toe by Toe (Cowling, K. and Cowling, H., 1997) phonics programme, Daniel began to make gains in his reading. In June 2011 Daniel could identify 14/26 letter sounds in his Middle Infant Screening Test (MIST) (Hannavy, S., 1993) and by November 2011 of first class his sound recognition had increased to 23/26 (see Appendix I for Daniel's profile). As his self esteem increased Daniel was more willing to try to decode words he did not know rather than refusing to attempt as he had done before. All parties involved felt that it was important that this positive change in Daniels self concept be continued and encouraged. Daniel's IQ is in the average range so undoubtedly his low self confidence was a factor preventing him from reaching his potential. Interestingly, Keshner in his study of pupils with learning difficulties argued that self-concept was a better indicator of successful achievement than IQ (Keshner, 1991). Having witnessed the progress Daniel was making and the enthusiasm and effort with which he now faced challenges and the support he was receiving

at home I believed he was a candidate who could benefit most from a targeted intervention.

Finally, Daniel received support both in class and through withdrawal in a one to one setting. Both the class teacher and I felt that the in class support was not working as effectively as it could. Daniel worked well in a one to one setting but was distracted in the class environment. He would be annoyed if I spent time with other pupils and, even though we would have prepared the material before hand, Daniel would not participate fully in class activities. Though Daniel had many friends in the class and was generally a happy and well liked child he became quiet and nervous in the whole class setting. Pupils with reading difficulties are likely to struggle in whole class situations according to Vaughan et al(2001) and Daniel's story reflects this. As such both the class teacher and I felt it was necessary to adapt the way in which we used the 'in class' time. To summarise, Daniel was selected because his reading difficulties were undermining his whole educational development and in having a negative effect on his self esteem was causing him to fall further and further behind his peers. Secondly, both Daniel, his parents and I had a good working relationship, we had a united view of what we wished to see Daniel achieve and all felt that though progress was being made that there was potential for further gains. Finally both the class teacher and I felt we needed to modify our instruction to best utilize the in class time available.

Research Methodology

This case study is based upon the principles which underpin action research. It is an attempt through the use of various quantitative and qualitative methods to gather and analysis information such that it may inform our teaching methodology. Perhaps one of the most widely accepted definitions of action research is that given by Carr and Kemmis where they maintain that:

> "Action Research is a form of self-reflective enquiry undertaken by participants (teacher, students or principals, for example) in social (including educational) situations in order to improve the rationality and justice of (a) their own social or educational practices, (b) their understanding of these practices and (c) the situations (and institutions) in which these practices are carried out." (1986, pg 162)

Action research is a way of improving education through change by encouraging teachers to be critically aware of their own practice and through this awareness be open to the possibility of altering their approach. This type of research should be a collaborative, participatory and self evaluative process (Cohen and Mannion, 1994). It should be research "WITH, rather than research ON." (McNiff, 2002, p. 4). It is also worth noting that the project which is being monitored does not have to be successful in order for the research to be

worthwhile (McNiff et al., 2003). The aim, therefore, of action research is not merely to judge the success or failure of a method but to arrive at recommendations of good practice that will improve the performance of an organization or individual (Denscombe, 2003). The research design of this assignment is a case study. This design allows for a specific area to be studied in depth (Bell, 2005). Ary et al. define a case study as being "particularistic... descriptive... and heuristic" (2010, p. 444). A case study should describe a particular situation with the aim of providing new insights. At all times in the research process the researcher should be aware of relevant ethical issues and ensure he/she has received informed consent from the involved parties (Cohen and Manion, 1994). In keeping with this I met with Daniel's mother and explained the purpose and method of the research and she gave her written consent As in all research the methods selected for gathering the required information are of vital importance.

This study made use of both qualitative and quantitative methods.Qualitative methods often involve observations, both formal and informal, interviews and document analysis while quantitative research relies on the examination of cause and effect through statistical analysis and review of test data (Lichtman, 2010). The particular qualitative methods used in this assignment were interviews, observation of the intervention, miscue analysis and document analysis, all of which are the most prominent data collection strategies (Ary, et al., 2010). Daniel's mother was formally interviewed after the intervention and information was gathered prior to the project both informally and through the parent teacher meetings. Daniel's tutor, George, was also formally interviewed post intervention. A running observation record was kept during the project. Various documents in relation to the running of a paired reading scheme and the effectiveness of such scheme as recorded in studies were analysed. Quantitative methods used included pre and post testing using Neale Analysis of Reading Ability – Revised (Neale, 1997) and B/G-Steem Primary Scale (Maine and Robinson, 1998). A survey was carried out on the tutors and tutees also. Finally, Daniel was retested on such items as the Dolch Sight word list and his letter recognition.

Student's Biographical Details

The following information in relation to Daniel has been gathered through discussion with Daniel himself, his mother, his previous teachers (all of whom are currently working in the school) and with outside agencies such as his current speech and language therapist. Other sources consulted were his psychological assessment, his speech and language reports and the teacher's end of year reports.

Daniel is the youngest child in a family of two children. His older brother is twelve years old and is in fifth class. Daniel was born by emergency caesarean section three weeks early following a normal pregnancy. Daniel's mother reported that he was a difficult baby and hard to settle at night. He reached his

developmental milestones, apart from speech, within the normal limits. Daniel babbled as a baby but his receptive and expressive language did not develop to expected norms. Both Daniel's hearing and vision are reported as fine. At the commencement of school, in 2009, Mrs. D described Daniel as having a poor appetite. Daniel does not sleep through the night on a regular basis, though this has improved during the year. Daniel's family are quite close, he is rarely if ever separated from his parents or brother. There is no evidence of a typical behaviour and Daniel engages in exploratory, pretend and cooperative play both at home and in school. He has great interest in farming and farm machinery.

In March 2009 Daniel was assessed by a Speech and Language therapist (SLT), as a result of concerns in relation to his delayed development. In her assessment, the SLT reported that Daniel presented with a severe to profound delay/disorder in the acquisition of language skills. In June 2009 Daniel was assessed through the National Educational Psychological Service (NEPS). The psychologist described Daniel as a pleasant, smiling child who, though initially quite shy, applied himself well and interacted appropriately. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III) (Wechsler, 2003) was administered. Daniel's verbal IQ was within the low average range while his performance IQ was within the average range. This score suggested that Daniel's non-verbal cognitive abilities were more developed than his verbal skills, which is a consistent profile for a child with a language disorder. As a result of this, and his SLT report, Daniel began attending speech and language classes; he also qualified for resource hours. The psychologist recommended activities to develop Daniel's fine motor skills and that a multi-sensory approach to learning be used so as to teach to Daniel's visual learning style. A rich language environment with a structured phonics programme was also advised. It was anticipated that though Daniel presented as a happy child that he would experience frustration and that every effort should be made to enable him to experience success and to over learn material. The possibility of cooperative/paired learning was also advocated. Daniel's SLT update in October 2011 noted improvements in both language and speech. In October I also met with Daniel's SLT and we discussed and planned our approach with Daniel for the year. In the area of Speech and Language I was to support the material covered in the SLT sessions but not in too intensive a manner. The fear being that Daniel would feel over loaded with material and that excessive correction/emphasis on his speech could negatively impact upon his self esteem. Therefore, it was decided that my emphasis would lie in the area of Daniel's school subjects, with particular importance being given to phonics and Daniel's speech production of the written word. Both the SLT and I recognized the need to develop and enhance Daniel's self esteem. Daniel's most recent update, April 2012, again noted "great improvements" in Daniel's speech development. Daniel's receptive language scores are now in the mild range while his expressive vocabulary is in the average range.

Daniel's former teachers and parents describe how it took a while for him to settle into school but that good progress was made with his handwriting and maths. His letter sounds recognition improved in senior infants but was still below the class average. Though he presented with speech difficulties improvements were noted each year. Socially Daniel has always interacted well with his peers and is a genial and well liked child. Daniel can be initially shy with adults but will interact. An area of growing concern, as predicted by the psychologist, was Daniel's self esteem. As time went by Daniel became more conscious of his difficulties and the achievement gap between himself and his peers. This was most notable in the area of literacy where Daniel would refuse to attempt writing or reading tasks. In a meeting with Daniel's SLT in October 2011 she expressed concerns over self esteem and the need to provide Daniel with opportunities to succeed. This year, as mentioned above, Daniel's self efficacy has improved. A phonics programme and new graded readers have been introduced. The Language Experience Approach (Ashton-Warner, S., 1963) has worked well with Daniel as he is now not only eager to write, invariably about tractors, but reads out his stories to the other classes and revels in the positive attention. When asked about school it is these stories and being able to read them to others that Daniel talks about with obvious pride. He is conscious of his development in literacy much more than any other subject and seems to regard it as the central facet of his educational life, a view commonly held by pupils (Nes Ferrara, 2005). For a more detailed view of Daniel's educational we shall turn our attention to the in school assessments carried out recently and in particular the results of the pre intervention test.

Assessment

Assessment is defined by Mariotti and Homan as the "systematic process of gathering information about students" so as the teacher can make instructional decisions about how best to meet the child's needs (2005, p.1). The assessments discussed here relate specifically to the area of literacy and self esteem. The rationale for the selection of the tests will be discussed, their results analysed and a table given to summarise the findings (These results can also be found in Daniel's profile in Appendix I).

Date	*Test*	*Administered by*	*Outcome*
June 2011	MIST (Hannavy, S., 1993)	Class Teacher	Listening skills 13/15 Letter sound 14/26 Three phoneme words 0/30 sentence dictation 0/36
October 2011	Phonological assessment battery (Frederickson et al., 1997)	Resource teacher	3 areas below SS 85 indicate phonological problems, Daniel has 7 areas below

November 2011	Jackson Phonics (Jackson, S., 1971)	Resource teacher	20/26 letter sounds and 23/26 letter names
November 2011	Dolch List (Dolch, 1948)	Resource teacher	26 out of the 120 most frequent Dolch list (ref?) sight words
January 2012	Schonell Graded word reading test (Newtown, M and Thompson, M, 1983)	Resource teacher	Reading age 6 yrs Chronological age 7 yrs 3 month
January 2012	Schonell Graded Spelling test (Newtown, M and Thompson, M, 1983	Resource teacher	Spelling Age 5.2 yrs CA 7:03

As can be seen from these results, though Daniel's understanding of letter sounds was improving, he still presented with significant literacy difficulties. Daniel's reading lacked fluency and he would read in a stop-start fashion, concentrating on each word, without intonation. As mentioned previously, Daniel displayed no obvious decoding strategies, relying instead on his sight memory and visual cues from the story's pictures. This difficulty with decoding could be most clearly seen when I carried out a miscue analysis on Daniel's reader. Over 90% of his errors were refusal. In the vast majority of cases he did not attempt the word rather he would say 'don't know'. The same could be said of any of his tests; Daniel either knew the answer or said 'don't know'. Daniel's pre-reading skills of visual discrimination, visual sequential memory, sound blend and auditory sequential memory were determined using sections of the Aston Index (Newtown, M and Thompson, M, 1983). These tests revealed difficulty with auditory memory and sound blending. Such difficulties also manifested themselves in the area of phonological awareness as seen above. In addition, Daniel's literacy difficulties manifested themselves in his free writing. In October, an attempted free writing session did not produce any written material. Daniel declared he did not want to write nor know what to write with the result that, despite much coaxing, scaffolding, prompting and encouraging, nothing was written. In December, we had another free writing session. Daniel was much more eager to write on this occasion as by this stage he had completed two little books using the Language Experience Approach (Ashton-Warner, S., 1963). His writing sample showed good letter formation and an effort to spell words phonetically. Daniel is between the partial and full alphabetic stages, as defined by Ehri (2002). As his test results show, Daniel recognizes letter-name to letter sound correspondence; however, he cannot read words by analogy to sight words he knows. He tends to confuse words with similar letters but he is beginning to better understand the relationship between the sound of words and

the letters representing those sounds. In class observation was another method used to monitor Daniel's participation, motivation and ability for the tasks set.

The literacy test chosen as the specific pre intervention assessment was the Neale Analysis of Reading Ability – Revised (Neale, 1997). The Neale analysis is a standardized reading test which measures reading rate, accuracy and comprehension. Reading fluency is also informally assessed through a combination of the aforementioned three factors and by teacher observation of the pupils reading (Oakley, 2003). Spooner et al. (2004) regard the Neale Analysis of Reading (NARA) as an effective assessment tool as the two parallel versions of the test enable it to be used twice which allows the child's progress to be assessed over time. In NARA the teacher listens to the pupils reading and records the errors that are made. This miscue analysis gives an important insight to the type of errors the pupil is making. After reading the passage, which is timed, the pupil then answers oral comprehension questions. These comprehension questions ensure that the child's reading for meaning is assessed. The results of Daniel's assessment can be seen below.

NARA Feb 2012	Standard Score	Percentile	Sten
Accuracy	72	3	1
Comprehension	80	9	2
Rate	79	8	2

It is also interesting to note that 67% (6 out of 9) of Daniel's errors were refusals, highlighting his lack of confidence to attempt the word.

Self esteem is the social and emotional foundation upon which a pupils learning is based and as such is one of the most important needs to be considered in a pupil's learning (Price, 2001). Self esteem can be defined as the "individual's *evaluation* of the discrepancy between self image and ideal self" (Lawrence, 1996, p. 5). The correlation between self esteem has been well established (Lawrence, 1996; Fuchs et al., 2001) indeed many parents regard an improvement in the child's self esteem as the most important outcome of specialist support (Riddick, 1995). Therefore, it was important to monitor the pupils self esteem informally through observation and in more formal manner through the use of B/G-Steem Primary Scale (Maine and Robinson, 1998). This scale rates both self esteem and locus of control and has been standardized on pupils in British schools aged between six and thirteen (ibid). In the B/G- Steem assessment Daniel scored within the normal range of self esteem with a normal locus of control. Daniel scored higher than expected on self esteem and this result does not reflect Daniel's observed behaviour in class where he is quiet and

reluctant to engage in class discussions. However, in the areas of school work and ability Daniel displayed a low self efficacy. He did not regard himself as a good reader or as clever as other children nor did he believe his school work was good.

Evaluation and Synthesis of Information

The previous sections have highlighted the needs Daniel has in literacy and speech. While Daniel faced challenges he also had a variety of skills and talents. Daniel is generally a happy child who mixes well with his classmates. He has a good sense of humour and has a good attitude towards school. He also receives great support from home. Daniel has a good understanding of early number and his class teacher describes his literacy difficulties as a major stumbling block in maths. The main areas of concern in relation to Daniel are his literacy and speech development. As discussed previously, work on Daniel's speech production was to take place in conjunction with the SLT. Daniel's tests, both formal and informal, revealed needs in the area of reading accuracy and fluency; his word attack skills and his phonic and phonological awareness. Self esteem was also identified as an on-going need. A table of Daniel's needs and strengths can be seen below and a more in depth description of his abilities and challenges can be seen in his profile (Appendix I)

Abilities, skills and talents	*Needs*
• Good sense of humour • Number – good understanding of early number • Good focus and concentration • Great support from home • Good attitude – eager to learn, good concentration. • Happy child, mixes well with peers • Self confidence is improving • Interest in farming, tractors, horses • Improving letter and sound recognition	• Expressive language – particularly the final sounds • Develop phonological awareness • Phonics • Develop word attack strategies • Writing – particularly structure and content • To continue improvement in self esteem • Reading • Maths – operations and problem solving

Daniel's priority needs were identified as follows: Self Esteem – To develop self esteem by providing structured opportunities for success and by increasing involvement in class discussions; Expressive Language – to work on the pronunciation of cvc words; Reading – develop a word attack strategy, improve accuracy and fluency; Phonics – Initial phonic sounds, up to four letter

phonemic blends; Writing – to develop competence and confidence in his free writing by using known words to create sentences.

Recommendations for teaching and learning

Using these priority needs a programme of work was drawn up with input from all the concerned parties (Appendix I). It was agreed that a structured, multisensory phonics programme be introduced to develop Daniel's awareness of the letter/sound relationships and of three letter blends. Toe by Toe (Cowling, K. and Cowling, H., 1997) was selected as the phonics scheme to be followed. The word attack strategy to be employed was based upon Daniel's developing knowledge of phonics. The first step was to encourage Daniel to use the initial letter sound to decode words, building towards segmenting and blending. The 'Pause Prompt Praise' method (Burns, 2006) was also to be used at home and in school. This increased decoding skill was then to be used to improve Daniel's fluency and accuracy in reading. Both a whole word approach (Beck and Juel, 2002) and a phonics approach were employed to tackle Daniel's reading difficulties. Daniel's new words, once known, were placed on his word wall. These words were then used as the basis for Daniel's writing. Using the Language Experience Approach (Ashton-Warner, S., 1963), Daniel was taught how to brainstorm and plan his story using words from his word wall. Daniel would create a story which was then typed and made into a book using pictures Daniel chose from the internet. Daniel then read his stories to the various classes. In this way his new words were reinforced; his self confidence and enjoyment improved as he realized the power and benefit of words and his reading skills were practiced in a real life situation. Along with these aims, which are outlined in Daniel's IEP (Appendix I), the need to increase the amount of reading was also targeted so as to combat the experience deficit that was discussed previously. Paired reading, using cross age peer tutors, was chosen as the means to combat this deficit and to also meet the other targets of improving accuracy and fluency, developing self esteem and developing Daniel's word attack skills.

Paired reading, which is a type of choral reading undertaken by two readers with one more proficient than the other (Westwood, 2003), is a strategy which is an appropriate intervention to tackle the aforementioned literacy difficulties encountered by Daniel. Paired Reading was devised by Morgan (1976) to be a simple to administer intervention which would meet the needs of children who were encountering difficulties with reading. It was further developed and researched by Topping and Linsday (1992) and is currently used by over 20 percent of teachers as one of their main methods in teaching pupils with reading difficulties (McPhillips et al., 2009). The specific type of paired reading that will be discussed is that which involves peer tutoring, that is a paired reading approach where children read with other children in the role of tutor and tutee (Topping, 2003). Paired, or peer, reading has a long established history of success and extensive research, with large samples, has identified significant

reading gains for participants (Nugent 2011; MacDonald, 2010; Brooks, 2002). Paired reading is successful, enjoyable and pupils like it (Butler, 1999). It also represents an opportunity to increase in-class support. Various circulars, in particular SP.ED 24/03 and SP.ED 08/02, and the *Learning Support Guidelines* (DES, 2000), advocate a reduction in the levels of reliance on withdrawal as the vehicle of support teaching. Studies have shown that pupils with literacy difficulties, such as Daniel, make better progress in small peer group arrangements than in a whole class teacher directed setting (Greenwood et al., 2003; Vaughan et al., 2001). Paired reading represented an opportunity to make better use of Daniel's in-class support time.

Studies also indicate that peer reading can result in considerable gains in reading. Brooks (2007) in his report on Topping and Lindsay's study (1992) which involved 2,372 pupils recorded ratio gains[1] of 3.3 in reading and 4.3 in comprehension. Studies continue to show gains similar to these findings (Topping, 2001). Paired reading is also proven to improve reading fluency (Wright and Cleary, 2006) where fluency is accurate, smooth oral reading with effortless decoding (King, 2006). Improvements in self esteem have been recorded in students involved in a paired reading programme involving peers (Wright and Cleary, 2006). By setting realistic targets through the use of individualized programmes pupils are given the opportunity to succeed and thereby improve their self confidence, which in turn leads them to read more (Connolly, 2009). Cross age peer reading is particularly effective in raising pupils self worth and self competence (Miller et al., 2010). Therefore, paired reading seemed an appropriate means by which Daniel's reading fluency and accuracy could be improved, while also tackling his reading deficit and improve his self efficacy. During the six week intervention Daniel continued to attend his one to one support sessions.

Implementation of Programme

The specific programme implemented was based on the paired reading scheme outlined by Fiona King (2006) and the *Passport* (2001) approach produced by Mary Immaculate College. The pupils of fifth and sixth class acted as tutors to the students in first and second class; third and fourth class played a similar roll with junior and senior infants. This was the first time a paired reading scheme was used in the school so appropriate training was given to the tutors based on the method outlined by Yarrow and Topping (2001). The intervention was timetabled to begin on Monday 20th of February and was set to run for six weeks. It took place on Monday, Wednesday and Friday for half an hour, directly after small break, as recommended by King (2006). Prior to the commencement of the intervention the class teachers and I paired pupils together based on reading ability and compatibility of personalities. A couple of sessions took place

[1] Ratio gains are a calculation of the rate of progress over the time of the intervention (Brooks, 2007).

where the pairs were given an opportunity to get to know each other, asking questions and engaging in team building exercises. The PM graded readers were purchased as the reading scheme to be adopted.

A miscue analysis was carried out with Daniel to determine the appropriate level on which to start. Daniel was found to read at the instructional level (Fuchs et al., 2001) at grade four of the PM readers. The individual sessions followed a structured format. The unknown words from the previous were studied which involved dividing the word into syllables, highlight know parts or sounds etc. Unknown words were kept in a bag marked with a yellow question mark if the student got the word correct on three consecutive occasions, as recorded by ticks on the back of the word; it was moved into the known words bag. These known words were revised every Friday with the tutors using games such as 'I spy' to reinforce the pupils learning. Following the revision of words the tutor and tutee read together, with the tutee setting the pace. The tutee could choose to read alone at any stage by using a signal. The tutors were trained to use the 'Pause Prompt Praise' method (Burns, 2006) when a tutee encountered a difficult word. If the tutee did not know the word it was recorded by the tutor and segmented as described above. The tutors were encouraged to discuss the book before and after reading eliciting pupils knowledge and opinion of the book. In this way reading with understanding was assessed. During each session the teachers monitored each pairs reading ensuring the children were on an appropriate level, by seeing how many known words they encountered, and that the tutor was supporting the tutee appropriately. In Daniel's case, I listened to his reading in each session and monitored his reading to ensure the book was pitched at the correct instructional level.

Evaluation of Learning Outcomes

The effectiveness of the paired reading scheme was assessed both during and after the intervention. During the six week paired reading scheme a running record of observational comments were kept. This record shows that at the beginning of the intervention Daniel was reading with 92% accuracy at level four in the PM reading scheme and by the end he was reading with 93% accuracy at level eight. Daniel read twenty threes books in eighteen sessions and encountered twenty four words he was unable to read. Both the class teacher and observed an increase in Daniel's accuracy and also in his willingness to attempt to decode new words. These observations were borne out when I re-tested Daniel at the end of the six weeks.

Post intervention Daniel was assessed with form two of the Neale Analysis (Neale, 1997). Daniel made a gain of eight standard scores in the area of accuracy and his reading rate increased. These results are similar to those made in Murphy et al. (2008) study where pupils made gains of five standard score points. Interestingly his comprehension score dropped, which is at variance with

others findings in this area (Brooks, 2007). Daniel's drop must be viewed in the context of the test. In both form one and two Daniel answered the four comprehensions correctly but form two is weighted differently. On level two in both forms Daniel's could not be scored as his error count was too high. However, when Daniel was retested on form two he was actually able to four comprehension questions correctly as compared to two correct answers on form one. There was a notable change in the type of errors Daniel presented with. In the initial assessment 67% of Daniels errors were refusals in his re assessment Daniel had no refusals – all his errors were substitutions. This highlights that Daniel is attempting to decode rather than refusing to attempt the word as he did previously. In contrast to other studies (MacDonald, 2010) Daniel's reading rate did not fall but actually increased. A comparison of Daniel's test results can be seen below.

NARA Feb 2012 Form 1	**Standard Score**	**Percentile**	**Sten**
Accuracy	72	3	1
Comprehension	80	9	2
Rate	79	8	2
NARA March 2012 Form 2	**Standard Score**	**Percentile**	**Sten**
Accuracy	80	9	2
Comprehension	79	8	2
Rate	84	14	3

An improvement in Daniel's fluency was also noted by his class teacher, his tutor and his parents. Daniel's mother was interviewed after the intervention and she recorded an observed improvement in Daniel's accuracy and his pronunciation of words. Daniel, according to Mrs. D, thoroughly enjoyed paired reading as a result is more willing to read and now reads independently at home.

First and second class, the tutees, and fifth and sixth, tutors, were surveyed, to examine their opinion of the scheme. The results of the survey show the vast majority of tutors believe that paired reading resulted in their tutee making less mistakes; reading with more intonation; reading with a steadier flow and becoming more confident in reading. Specifically Daniel's tutor answered positively to all the questions and commented that Daniel was now more confident in his reading. Indeed, the three most common comments made by the tutors about their partners in the survey were: he/she is more confident; he/she

makes less mistakes and he/she is now a better reader. In the tutee survey Daniel answered positively to all questions except one. According to his answers, Daniel enjoyed paired reading and he feels his reading has improved. He also feels more confident and interested in reading. For the statement 'I will read more in class' Daniel answered 'not sure'. So though his confidence has improved he is still wary of reading in class. This improvement in self esteem was also reflected in an increased score in Daniel's B/G Steem assessment (Maine and Robinson, 1998). Daniel's self esteem moved from within the normal range to the very high range. As compared to his initial rating, Daniel now regards himself as good at reading; as clever at other children and not needing a lot of help.

Daniel has made significant gains across the board since Christmas. His sight word recognition has increased as has his knowledge of the letter names and sounds. This increased awareness is reflected in an improved reading and spelling age. In the spelling test in particular Daniel was much more willing to attempt words he was unsure of and applied his phonic knowledge i.e. cut spelled as kot. Daniel's free writing also improved as with no prompting or scaffolding he wrote two complete and correctly spelled sentences. A summary of Daniel's assessments can be seen below.

March 2012	Jackson Phonics (Jackson, S., 1971)	Resource teacher	26/26 letter sounds and 26/26 letter names Can now segment and blend 3 letter words (April 2012)
March/April 2012	Dolch List (Dolch, 1948)	Resource teacher	29/40 pre primer sight words April 2012 52/120 Dolch list words March 2012
March 2012	Schonell Graded word reading test (Newtown, M and Thompson, M, 1983	Resource teacher	Reading age 6:9 CA 7:05
January 2012	Schonell Graded Spelling test (Newtown, M and Thompson, M, 1983	Resource teacher	Spelling Age 5.8yrs CA 7:05 using knowledge of phonics in his spellings – kot for cut, frm for from

The paired reading used in our school has been regarded by all participants as an enjoyable and beneficial experience. Daniel, though he is not alone, made gains in both the area of reading and his attitude towards it. The use of peer tutoring,

which had not been used in the school before, also provided a new dimension to the pupils learning as it created an opportunity for 'active learning' and pupil engagement (Greenwood, et al., 1989) While three thirty minutes sessions a week did require a lot of time input and disruption to classes it is something the school will be using again. In addition the fact that the pupils are now trained in the system will make it more efficient. For, while the tutors were very good and had received training there were initial teething problems such as the tutors dominating the reading or immediately giving the word when the pupil stumbled on an unknown word. Paired reading, while it is a successful intervention, is best used in conjunction with other supports. The awareness of letter sounds and sound blends, according to the National Reading Panel, are the two biggest predicators of reading success (National Institute of Child and Human Development, 2000). Daniel's word attack strategy and his ability to decode unknown words were primarily improved by the introduction of a structured phonics programme. Paired reading provided the means of practising these skills repeatedly and in a supportive environment but on its own paired reading would not develop these phonics skills. Paired reading is an opportunity for a pupil with reading difficulties to combat his experience difficulties by engaging in repeated reading (Connolly, 2001) and to practice and generalize his reading skills (Vaughan et al., 2001).

Daniel has undoubtedly made gains as a result of, but not solely because of, paired reading. As a result of this intervention Daniel's reading ability has improved but perhaps most importantly he is now an eager reader with an increased sense of self efficacy. To continue Daniel's gains certain adjustments have been made to his programme. The use of graded readers was very important to the improvements Daniel made. As Ott (1997) described these readers provided a structured and cumulative programme which was tailored to the individual pupils needs. Therefore, the first and second class teacher has moved away from a single class readers to ability based groups using various graded readers. A set of supplementary readers were also purchased which contain no new words so Daniel can now read material independently and reinforce the material he has previously covered. In the area of phonics and writing Daniel is following the same programmes as before with an increase in task difficulty.

Conclusion

In conclusion there is no one single method, for ensuring pupils with literacy difficulties succeed in reading (Duffy and Hoffman, 1999). Just as there is a continuum of needs there must be a continuum of supports (Government of Ireland, 2001). Paired reading, while not the only solution, has proven to be an effective teaching model which has improved Daniel's self esteem, fluency and reading skills. It is an inclusive intervention which adapted the teaching organisation and methodologies to meet Daniel's individual needs. In doing so

it corresponds to the Reading Association of Ireland's belief that interventions should be responsive to the needs of the learners and be active and engaging (Reading Association of Ireland, 2011). Paired reading for Daniel represented the necessary 'spark' to ignite his interest in reading and to develop his ability. This start needs to supported and fostered to ensure that Daniel's reading continues to flourish for , as Victor Hugo described it, "To learn to read is to light a fire; every syllable that is spelled out is a spark." (2007, p. 110)

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APPENDIX I
Profile and IEP

Student Profile

Biographical Details

Name:	Daniel
Date of Birth:	11/10/04
Address:	Class: 1st
Teacher:	Parents:
Outside Agencies/Professionals:	NEPS psychologist; Speech and language therapist

Nature and Degree of SEN: Speech and Language disorder
Assessed by: Psychologist June 2009; Speech and Language Review October 2011 and April 2012.
Support Services: attends speech and language group
Accommodations: 3 hrs 36 mins resource time

Present Level of Educational Performance

Formal Assessment

Date	***Test***	***Administered by***	***Outcome***
June 2011	MIST	Class Teacher	Listening skills 13/15 Letter sound 14/26 Three phoneme words 0/30 sentence dictation 0/36
November 2011	NRIT	Class teacher	*Quotient* 85
November 2011	Phonological assessment battery	Resource teacher	*Phonological assessment Battery* November 2011 *Phonological Awareness:* Alliteration Test SS 74 Rhyme SS 94 Spoonerisms SS 88 Non-word reading SS 0 *Phonological Production Speed:* Naming Speed (pics) SS 79 Naming Speed 9 digits) SS 74 *Phonological Fluency:* alliteration SS 70 Rhyme SS 73 3 areas below SS 85 indicate phonological problems, Daniel has 7 areas below
May 2012	MICRA T Level 1	Class Teacher	(age based) Standard Score 76 Percentile 5 Sten 2 Reading Age 6:07 CA 7 yrs 6 mths

Summary of Information

(from parents, student, class teacher, resource teacher etc.)

Self-management skills: consistently remembers material required for class, manages personal property independently. April 2012: started swimming and can manage changing/clothes etc.

Concentration: can maintain focus on task for required period of time in both group and 1-1 settings.

Social and Interpersonal skills: mixes well with peers, will initiate game/conversation, a pleasant and happy child who is liked by his peers.

Self-esteem: a happy child who previously was slow to be involved in class discussions, this has improved and Daniel participates without prompting in class. Can become frustrated if he has to repeat sentences which are not understood. Feb 2012 In B/G-Steem primary scale Daniel scored within normal self esteem with a normal locus of control. Daniel scored higher than expected on self esteem, this result does not reflect Daniel's observed behaviour in class where he is quiet, reluctant to engage in class discussions and rarely if ever volunteers to read out loud – though passage has been prepared and is at appropriate level. April 2012 – self esteem constantly improve, participates more in class. Benefited from paired reading scheme. In B/G – Steem scored in the very high range for self esteem with a normal locus of control.

Literacy Skills

NARA Feb 2012 Form 1	**Standard Score**	**Percentile**	**Sten**
Accuracy	72	3	1
Comprehension	80	9	2
Rate	79	8	2
NARA March 2012 Form 2	**Standard Score**	**Percentile**	**Sten**
Accuracy	80	9	2
Comprehension	79	8	2
Rate	84	14	3

Language and Communication

Oral Language

Receptive: In the Speech and Language Report update of October 2011 Daniel scored within the moderate range in receptive language. SLT update of April 2012 notes great overall improvements in Daniel's receptive language skills, he scored within the Mild range.

Expressive: Psychological report places Daniel's expressive language at 2-3 standard deviations below the norm. Speech and Language update: Daniel is deleting final sounds in words and reducing consonants cluster difficulties with /l/, /s/, /ch/, /f/, /sh/.

Daniel enjoys talking and on topics that interest him, he is eager and willing to engage in conversation. In the Speech and Language Report update of October 2011 Daniel scored within the mild range in expressive vocabulary. SLT update Apr 2012 noted improvements in Daniels intelligibility at sentence and connected speech. Continuing patterns of error were noted such as reduction of consonant clusters gloves – goves, sequencing sounds at multi syllabic level. Toe by Toe has greatly benefited Daniel and in his reading speech errors are much reduced as he consciously produces sound required.

Pragmatic: initiates and maintains social conversation, takes turn and responds to others contribution, maintains appropriate eye contact.

Listening Skills: good listening skills, can follow 4 step instructions consistently.

Reading

Pre-reading skills: *Visual discrimination: 10/10 Aston Index Jan 2012.*
Visual sequential memory: Pictorial 6.5/10 Symbolic 6/10 Aston index.
Auditory sequential memory: 4/10 Aston Index.
Sound blending: .5/10 Aston Index

Phonological Awareness: see results of PhAB assessment attached which show poor phonological awareness and sound identification and blending. This error has much improved since the introduction of Toe by Toe in January. Daniel can now identify and recognize rhyming words and aurally discriminate initial sounds.

Phonic/Decoding Skills: Jackson Phonics Assessment 30th November 2011 recognized 23/26 letter names and 20/26 letter sounds. March 2012 Jackson Phonics Assessment 26/26 letter sounds and names. Can now segment and blend 3 letter words (April 2012).

Sight Vocabulary: 26 out of 120 Dolch list words on 30th November 2011.
Schonell Word Reading Test Jan 2012 CA 7:2 RA 6:6.
29/40 pre primer sight words April 2012.
52/120 Dolch list words March 2012.

Fluency: reads slowly and clearly but lacks intonation.
Schonell Reading Age Jan 2012 6:6 CA 7:03.
Improvement noted by both parents and class teacher in Daniel's fluency (april 2012).
Daniel reads with increased intonation and fluency .
March 2012 Schonell Reading Age Jan 2012 6:9 CA 7:05.

Word Attack Strategies: uses visual memory to recognize word, does not sound out.
March 2012 Since commencing Toe by Toe this has improved, now sounds initial letter.

Comprehension: oral comprehension better than written, is good to use visual cues but can be over reliant on this.

Writing

Spelling: January 2012 Schonell Spelling Test Age 5.2 yrs CA 7:03 – did not attempt spellings he did not know.
March 2012 Schonell Spelling Test Age 5.8 yrs CA 7:05 – using knowledge of phonics in his spellings – kot for cut, frm for from.

Penmanship: simple but clear letter formation, prints letters, forgets spacing.
March 2012 Spacing issue much improved.

Content: needs prompting, short descriptive sentences on a known topic e.g. tractors. In free writing sessions will now provide two to three sentences, with little prompting, based on sentences used in LEA stories or sentences used for home work e.g. Here is a tractor (May 2012).

Strategies: Lacks confidence in writing ability, struggles to generate own ideas, requires lots of prompting and assurance. Have used brainstorming with technique with Daniel to plan his stories, he likes and has benefited from this approach. Will now orally plan story, will choose topic independently.

ICT Skills: can turn on computer, good typing skills, can use a mouse efficiently. Enjoys NESSY phonics programme and typing his stories.

Mathematics Profile

Skills Development

Daniel can:

- Count a number of objects in a set
- Read, write and order numerals 1-10
- Combine sets of objects, totals to 10
- Use the language of the ordinal number first to tenth
- Add numbers without renaming
- Name and recognize 2D shapes
- Based on Halloween term assessment in class maths programme (Nov 2011) 9.5/20.

Ballard/Westwood Timed Arithmetic Scores CA 7:03		
	Addition	*Subtraction*
Raw Score	5	5
Mean Score	10	8.5
Critically Low Score	6	6

Motor Skills

Gross: good hand eye co-ordination, good movement but Daniel can be cautious in his movement as he had an infection in his hip last year.

Fine: good pincer grasp, writes clearly with a lot of concentration. April 2012 – writing more fluid, does not tire as easily

Access to Curriculum: following an individual reading scheme, written exercises modified to ability, following an individual spelling programme.

Learning Style: visual kinesthetic.

Attendance: Missed 9 days up to Easter. (7 days after Christmas).

Hobbies and Interests: farming, tractors, horses.

Abilities, skills and talents	Needs
• Good sense of humour • Number – good understanding of early number • Good focus and concentration • Great support from home • Excellent attitude – eager to learn, good concentration. • Happy child, mixes well with peers • Self confidence is improving • Interest in farming, tractors, horses • letter and sound recognition improving	• Expressive language – particularly the final sounds • Develop phonological awareness • Phonics • Develop word attack strategies • Writing – particularly structure and content • To continue improvement in self esteem • Reading • Maths – operations and problem solving

Priority Learning Needs:

Self Esteem: To develop Daniel's **self esteem** by providing structured opportunities for success.
Expressive Language – to work on the pronunciation of cvc words.
Reading: develop a word attack strategy, improve accuracy and fluency.
Phonics Initial phonic sounds, up to four letter phonemic blends.
Writing: to develop competence and confidence in his free writing by using known words to create sentences.

JOE O RIORDAN

Joe is a resource teacher in county Galway who has completed research in the areas of Philosophy and Education and recently concluded a postgraduate study in SEN.

STEM to STEAM

Vital Life Skills are learned through Arts Education

Michael O'Reilly.

Many education reformers around the world are currently focusing their attention on the need for arts education and new research findings focus on the need to train teachers in the delivery of arts programmes. The great education debate is beginning to focus on what is being termed "adding the A to STEM" or "changing STEM to STEAM". In case you don't get the acronym, STEM is education that focuses on Science, Technology, Economics and Mathematics. The A of course is Arts! This push for reform and refocus stems, not alone from the belief that art education has an intrinsic value in its own right, but the belief that such art education promotes a wide variety of life skills crucial to success in general. This is allied to changes in the belief that the arts are reserved only for people with "talent" and the understanding that, in the context of today's job market, it is creative individuals that are increasingly in demand. All business is struggling to find creative ways to stay in the market, in need of creative employees – arts education, it is argued, develops just such skilled individuals. CEOs around the world are identifying creativity as the most important leadership skill for the future. All list the following skills as the most needed skills.

- The ability to think creatively
- The ability to find solutions to challenging problems
- The ability to relate well to partners and clients
- The ability to communicate effectively
- The ability to adapt to changing markets and circumstances

The problem in education is that increasingly children are no longer spending their formative years honing this critical skill – they are spending too much time practicing so-called core skills from STEM subject areas. STEAM education acknowledges that we are all creative and argues that developing this creativity throughout life leads to better careers.

The arts encourage CREATIVITY in that they encourage children to think on their feet, to approach tasks in a variety of ways, to not only think outside the box but even to omit the box at times. This might be exemplified by the following curriculum objectives – to recite a monologue in a variety of ways, to make a painting representing a memory or to compose a new rhythm to enhance a piece of music.

The arts develop CONFIDENCE in that they encourage children to convincingly deliver a message to take command of a stage as it were, to step outside comfort zones and to make and learn from mistakes. Consider these objectives in that context: to perform a short piece of theatre with confidence, to present and talk about how you have built a construction or to play a musical instrument as part of a group.

The arts are about PROBLEM SOLVING. All artistic creations are born through the process of solving particular problems/tasks. Higher order thinking skills, reasoning, experimentation and understanding are all developed through process work as in objectives such as these: to turn a piece of clay into a novel character, to create a dance that represents a particular emotion or to dramatize a social issue.

The arts demand PERSEVERANCE and DEDICATION. In a world increasingly obsessed by the X-Factor, the mistaken notion that instant success/fame is possible, this skill is sadly decreasing. Children learn that playing Vivaldi the first time you pick up a violin is not an option. By working through art processes children learn that the practice of various skills and techniques is essential to achieving any success. When children get to practice following through with artistic endeavors that result in a finished product or performance, they learn to associate dedication with a feeling of accomplishment. They practice developing healthy work habits of being on time, respecting the contributions of others, and putting effort into the success of the final piece. Consider how this is inherent in the following objectives: to learn how to create a mono print, to learn to play a traditional piece of music on the recorder or to work with a small group to perform a scene from a script.

Work in the arts demands FOCUS. Much recent research has shown that participation in all the arts subjects improves children's ability to concentrate on tasks in all areas of their lives. In discussing their own and others visual art,writing, drama, dance or music children learn when to listen and when to contribute, they learn to balance these two key skills. Arts education also involves much NON VERBAL COMMUNICATION. Through experiences in drama and dance education, children learn the mechanics of body language and experience different ways of moving and how those movements communicate different emotions. Consider the following few objectives in this context: to look

at and respond to a piece of art from another culture, to listen to a piece of music and write a short poem about this or work with a small group to recount a story using freeze framing.

The arts involve the giving and receiving of CONSTRUCTIVE FEEDBACK The giving and receiving of constructive feedback about a performance or about a piece of visual art is a regular part of any arts instruction. Children learn that feedback is an integral part of learning, that it is not something to be offended by or to be taken personally and is actually something helpful. The second strand units of all the arts subjects in the Primary School Curriculum focus primarily on this aspect of arts education.

Arts education involves COLLABORATION and ACCOUNTABILITY. Much art work can be collaborative in nature. Through the arts, children practice working together, sharing responsibility, and compromising with others to accomplish a shared goal or objective. When a child has a part to play in a rock group, in a group of mural painters or a drama or dance production, they begin to understand that their contribution is necessary for the success of the group. Through these experiences children gain confidence and start to learn that their contributions have value even if they don't have a major role. When children practice creating something together they get used to the idea that their actions affect others. They learn that when they are not ready or not on-time, that other people are affected. Through the arts, children also learn that it is important to admit a mistake and take responsibility for it. Because mistakes are a vital part of the process of learning in the arts, children begin to see that mistakes happen constantly. We acknowledge them, learn from them and carry on; "don't panic" – it is all part of the process. Consider the following few objectives in this context: to design and plan for a construction based on a particular theme, to work with a group to compose a sound story to accompany a poem or to edit/redraft a piece of writing/poem.

MICHAEL O'REILLY

Michael O'Reilly was the chairperson of the NCCA Arts Committee and worked for many years with the PCSP as a visual arts cuiditheoir. He is currently the lead tutor of the visual arts department in Hibernia College. He works as a shared learning support teacher, based in St. Fintan's NS, Lismacaffrey, Co. Westmeath, as a freelance illustrator and as an author with Gill and McMillan Publishers.

Differentiation in the Classroom: Making it Meaningful and Manageable for All

Thérèse McPhillips

Introduction

This paper aims to explore the language of differentiation and to acknowledge its shared understanding with inclusive pedagogy and universal design for learning. A second objective is to illustrate how effective literacy practices such as guided reading and comprehension strategy instruction are responsive to the varying needs and diversity of all learners and can make differentiation meaningful and manageable in the classroom.

The Language of Differentiation

The concept of differentiation is not original and is often referred to as personalised learning, inclusive learning, or individualised or person-centred learning. Differentiated instruction can be recognised as drawing together a range of different approaches derived from the theory, research and practice in the areas of cognitive psychology, special educational needs, assessment and inclusion. The role of differentiation in special education settings is well established and generally involves a student-centred teaching approach which aims to respond flexibly to individual students' learning styles, their readiness level and speed of learning, in order to maximise their learning opportunities in the classroom (Tomlinson, 2001). Furthermore, Tomlinson defines differentiation as *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, Brighton, Hertberg, Callahan, Moon, Brimijoin, Conover, & Reynolds, 2003, p. 121). Although differentiation is often associated with supporting students who have varying levels of difficulty, it was originally conceptualised to support 'gifted' or talented students as they moved into heterogeneous classrooms, (Willard-Holdt, 1994). Nowadays, differentiation is about making classrooms more responsive to the varying needs, talents and diversity of all learners.

In practice, this means differentiating across the following areas: the content (the ideas, concepts, principles, skills students will learn); the process (how the material is presented, how students interact with the curriculum content); the product (student output, assessment) and the learning environment (emotional

climate, communication opportunities). This model provides a reasonable scaffold or framework for teachers to plan across the curriculum for all learners (Tomlinson, 2001).

From a theoretical and conceptual standpoint, differentiation is not just about making adjustments for some learners, it is an understanding of the process of teaching and learning. This implies that learning is also a social and active process which involves mutual relationships (O Brien & Guiney, 2001). Differentiated instruction requires an attitudinal shift from the teacher *imparting knowledge* to the teacher as a *supporter of learning* (Corbett, 2001). Differentiation in the classroom is also supported in the literature on assessment for learning. Assessment for learning (AfL) is a valid and justified approach to learning (Black & William, 1998) and the key strategies in AfL also transfer the focus from teaching to learning. These key strategies are: sharing learning intentions and success criteria; providing feedback; discussions and questioning; self and peer-assessment, to ensure that students know what they learn and why. Keeping the focus on the learner and how he is learning demands responsive teaching- therefore, learning is necessarily differentiated according to the content, process and product.

Despite the central significance of differentiated instruction, teachers report this aspect of teaching and learning to be an area of difficulty (DES 2005, 2010; Eivers, et al, 2004, 2010). Concerns around literacy teaching in Ireland include inadequate differentiation in instruction, and preparation and planning (DES, 2010).

An evaluation of curriculum implementation in Primary Schools by the Department of Education and Science in 2005 noted gaps in classroom practice in English and Maths. The inspectors emphasised the need for more effective approaches to curriculum adaptation or differentiation in English lessons in two fifths of the classrooms observed (p 21). Similarly in Maths lessons, they noted that teachers needed further guidance on approaches to providing for individual differences in pupils ability, attainment and learning style (p 33). Lack of differentiation in teachers' plans and lack of differentiation to accommodate individual needs was also noted (DES, 2005). In relation to preparation and planning for English lessons, incidental inspection findings reported by the Inspectorate expressed concern that preparation by teachers was not satisfactory in 23.5% of the total number of lessons observed (DES, 2010). Differentiation or teaching in a multi grade setting was reported by teachers of pupils in second class as a 'priority topic for continuing professional development' (Eivers et al, 2010 p. 58).

As the Primary School Curriculum is currently under review (Kennedy et al, 2012) and the Junior Cycle Curriculum Framework (DES, 2012) has recently

been introduced, it is timely to consider teaching approaches which are inclusive and focus on everyone in the classroom. This can empower teachers to make differentiation achievable and practical. This paper aims to address this issue.

An Inclusive School implies Differentiated Instruction

Dealing with diversity and difference is one of the biggest challenges facing schools across Europe (European Agency for Development in Special Needs Education, 2011). Barriers to learning and participation such as inflexible or irrelevant curricula, or negative attitudes about some children's potential have been well documented; all these may be exacerbated by inadequate preparation of teachers (Forlin, 2001).

The term 'inclusive pedagogy' refers to practices which keep the learner at the centre of the process of teaching and learning. Key underlying assumptions of inclusive pedagogy are that that this is an approach that requires a shift in mind set from approaches that work for *most learners* – and additional support for those who experience difficulties – towards one that involves learning opportunities that are made available *for everyone*. In other words, additional supports are replaced by providing inclusive learning opportunities for all (Florian & Linklater, 2009). This approach rejects the notion of deterministic beliefs about an individual's abilities, and provides a framework for teachers to realise they can teach all learners, that differences in learning are the norm rather than the exception. Inclusive pedagogy views differences among learners and diversity in learning as a professional challenge for teachers to extend what is ordinarily available in the classroom to all learners (Florian & Black-Hawkins, 2011).

An innovative teacher education project in Scotland has redesigned initial teacher education through the lens of an inclusive pedagogical approach. The Inclusive Practice Project in Scotland has focused directly on the knowledge and skills needed for teachers to be inclusive in their practice (Rouse & Florian, 2012). The Inclusive Practice Project is based on a concept of inclusive pedagogy which recognises that with appropriate support, class teachers can accept with confidence the responsibility for teaching all children in inclusive classrooms (p. i).Essentially this implies that the classroom teacher accepts responsibility for all pupils in ways that do not marginalise or stigmatise some learners as different from others of similar age (p. ii).

In Ireland, an Inclusive Education Framework (National Council for Special Education, 2011) was recently developed to support schools in their self-evaluation of practices to support inclusion. The guide recommends suitable teaching and learning methods which support '*active participation of the learner as the primary aim'* rather than placement or accommodation. This framework is structured under 10 thematic headings which are relevant for primary, post-

primary and special schools. Under Teaching and Learning Strategies proposals include 'the use of suitable teaching and learning methodologies, materials and arrangements. These include co-operative teaching, differentiation and the promotion of positive classroom relationships' (p. 36). Differentiation is incorporated within this framework across the content, process, product and environment of all settings. The Inclusive Education Framework also emphasises the need for changes within the education system and the school to accommodate the learner (NCSE, 2011). However, this author strongly believes that there is a need to further explore teachers' understanding of inclusive pedagogies and ways to embed this in the classroom.

Universal Design for Learning: Addressing learner variability from the outset
Giving all individuals equal opportunities to learn is the key rationale for another teaching model known as Universal Design for Learning (UDL) which is now integrated into the Differentiated Instruction teaching model.

Universal design was originally used in the field of architecture in response to a demand that physical access to buildings and products be provided to as many people as possible – for example, ramps, escalators, etc. In education, universal design includes more than physical access. It also includes cognitive access – digital books, text to speech software, scaffolds and support to express understanding, organising notes etc. Universal design for learning is a framework for developing flexible instructional goals, methods, materials, and assessments that meet the needs of all learners by considering their natural variability and diverse backgrounds from the outset rather than providing retrofitted solutions.

Universal Design for Learning is described as:

……. *a set of principles for curriculum development that give all individuals equal opportunities to learn. UDL provides a blueprint for creating instructional goals, methods, materials and assessments that work for everyone – not a single, one size fits all solution, but rather flexible approaches that can be customised and adjusted for individual needs'* (The Centre for Applied Special Technology, 2011)

These principles suggest that variability in learners is addressed from the start, and curriculum is designed with the needs of all learners in mind. Learners can progress from where they are rather than needing accommodation or additional support to achieve learning goals. The research evidence for UDL comes from neuroscience and cognitive science. The three guiding principles of Universal design for learning resonate with the language of differentiated instruction; they concern the *content* and *process* of learning and require more ways to demonstrate learning (*product*).

These principles (i) provide multiple means of representation; (ii) provide multiple means of action and expression (iii) provide multiple means of engagement. This relates to the what, how and why of learning. UDL differs from traditional approaches in that curriculum is designed with all learners in mind from the outset – rather than adapting the curriculum according to the

needs of learners or providing supplementary materials. UDL does not imply watering down the curriculum for some students and advocates using grade level texts and materials for all learners. By offering more ways to access the curriculum, more ways to participate in class and more ways to demonstrate learning, UDL fits in well with the principles of differentiated instruction and inclusive pedagogy (see Table below).

Digital and multimedia supports can provide flexible support for struggling readers. Electronic texts offer multiple means of representation and reduce the obstacles presented by decoding difficulties. The Centre for Applied Special Technology (CAST, 2011) has researched and designed digital and multimedia supports, for example, software such as www.bookbuilder.cast.org which offers students and teachers a flexible environment to create multimedia electronic books for a variety of purposes (Dalton & Proctor, 2007).

The table below illustrates the commonality across language used to describe the guiding principles of differentiated instruction, inclusive pedagogy and universal design for learning.

TOWARDS A COMMON LANGUAGE TO SUPPORT LEARNING FOR ALL

Differentiated Instruction – Key components	**Universal Design for Learning Framework Guiding Principles**	**Inclusive Pedagogy – Key concepts (requirements)**
[1]Content *(ideas, concepts, principles, skills students will learn)*	[2]Provide multiple means of representation (*alternatives for auditory/visual information e.g. text to speech tools; multi-media vocab; background knowledge hyperlinks; language translation for English language learners)*	[3]Concept of teacher's craft knowledge; what teachers do, know, believe [4]Apprenticeship of the head, heart, hand
[1]Process *(how the material is presented, how students interact with curriculum)*	[2]Provide multiple means of action and expression (strategic learning, e.g. reciprocal teaching *predict, clarify, question, summarise*; strategy instruction)	[5]Shift in focus from *additional needs* to *learning for all in the classroom;* focus on what is to be taught rather than who is to learn it
[1]Product *(assessment, student output)*	[2]Provide multiple means of engagement *(self-assessment; reflecting on learning, setting goals)* • Use authentic age appropriate texts and materials; • Develop choice and autonomy	[6]Rejection of deterministic beliefs about ability (not fixed) focus teaching and learning on what pupils can do rather than can't; use Assessment for Learning strategies to support learning
[1]Learning environment *(emotional climate, communication opportunities)*		[7]See difficulties in learning as professional challenges for teachers; working with and through other adults

[1] Tomlinson, 2001
[2] Universal Design for Learning, www.cast.org; Rose & Meyer, 2002
[3] Rouse, 2007
[4] Shulman, 2007
[5] Florian & Rouse, 2009, Florian & Linklater, 2010
[6] Florian & Black Hawkins, (2011)
[7] *Inclusive Practice Project* (Rouse & Florian, 2012)

Differentiation and literacy learning

There is need for a common language around differentiation which is meaningful for teachers and supports the key concepts and principles illustrated in the table above. Teachers find differentiation of approach within lessons difficult to implement, especially in large classes. We know that students with additional learning needs and disabilities need instruction that is more explicit, intensive, focussed, carefully sequenced and with frequent feedback from the teacher(Swanson & Hoskyn, 1998; Vaughn et al 2000; Slavin et al, 2008).

Wouldn't it be easier to teach the same material/knowledge/skills to all students and to differentiate the amount of support needed by individual students rather than simplifying the content and slowing the pace for some while managing the class? (Westwood, 2001).

The next section will outline differentiated teaching and learning strategies which are of particular relevance for the needs and interests of struggling readers and support differentiated instruction for all in the inclusive classroom.

Differentiated instruction is not a single strategy but an approach to instruction that incorporates a variety of strategies. That means responsive teaching, taking into account the unique individual needs of each learner. One example of differentiated literacy instruction is Guided Reading, described as *'an instructional context for supporting each reader's development of effective strategies for processing novel texts at increasingly challenging levels of difficulty'* (Fountas & Pinnell, 1996, p. 25). Guided reading takes place in small groups; children are matched with books at their instructional level following systematic assessment through running records (Clay, 1993). This type of flexible grouping of young readers is reported to be far more effective than the use of basal readers (whole class reading scheme) (Allington, 2013). The following are some practical suggestions to differentiate during guided reading:

- Regular Assessment – using formative assessment tools (running records) followed by analysis of errors (miscue analysis); group children according to their reading level
- Keep whole class instruction to a minimum- bulk of instruction in small groups or individually
- Rearrange the groups every few weeks according to their reading progress
- Provide daily guided reading instruction in these small groups
- Group children according to their demonstrated need e.g. comprehension strategy instruction *making connections, drawing inferences;* word solving strategies – demonstrating how words work- *letter/and or word work*
- Use gradual release of responsibility model to teach – think aloud – model – explain – guided practice – independent practice

Source: Watts-Taffe et al, 2012

For struggling readers, differentiation of reading instruction is closely linked to a Response to Intervention approach or stage model of support (DES, 2000; 2003). In other words, during literacy learning, the teacher notices and adjusts (differentiates) the environment, the process by which the child learns, or the product/outcome each student should achieve. In an RTI model of support, an underlying principle is that '*the boundaries between differentiation and intervention are permeable and not clear cut. Instruction or intervention must be flexible enough to respond to evidence from student performance and teaching interactions. It should not be constrained by institutional procedures that emphasize uniformity.*"' (International Reading Association, 2010). In other words, the teacher's professional judgements and decisions form the basis of responsive teaching. Grouping and regrouping children during guided reading is important to allow for the individual differences as children progress in reading fluency. Regular communication and planned collaboration with the support/resource teacher is vital. For example, sharing and reviewing formative data and understanding pupils' strengths and needs as a reader and as a writer will ensure differentiated and responsive literacy instruction. The class teacher has central responsibility for all pupils and the decisions s/he makes at this stage may prevent the development of long term reading difficulties (Mathes et al, 2005). Guided reading groups can be used as part of a whole class balanced literacy framework alongside Interactive Read-aloud (teacher reads aloud), Literature discussion (e.g. small group book clubs, Literature circles); Whole class mini-lessons (e.g. comprehension strategy instruction) and Independent reading. No single approach to instruction or intervention can address the various aims and needs of all readers but small-group Guided Reading instruction based on systematic observation and assessment offers a sound and flexible approach to differentiation in the classroom. Greater gains in word reading and comprehension have been found when teachers differentiated their instruction using small flexible learning groups during a centre or station time than did students whose teachers provided primarily whole class instruction (Connor, 2011). Understanding students' skill profiles as they are constantly growing and changing and matching amount and type of instruction to each profile is at the heart of differentiation *(Watts- Taffe, 2012)*.

Powerful teaching through Guided Reading

Guided reading is not about *learning to read a specific book*; it is about *learning how to read* (Pinnell & Fountas, 1998, p. 221) Guided reading is more than just forming small groups and using levelled texts. The goal of the guided reading lesson for the child is not just to read 'this book' or to understand a single text – it is to help the child to build a network of strategic actions for processing texts. Teachers who are familiar with Reading Recovery (Clay, 1993) will recognise that the teacher works from the child's responses and works with continuous reading texts and writing texts (and not just letters or sounds in isolation). Good readers use many different kinds of cues – visual, phonological, meaning and

language structure as they process print, and they use all these sources of information *simultaneously.* Fountas and Pinnell, (1996, 2013) describe this as a network of strategic activities readers use for processing texts. This involves thinking *within the text* (such as: solving words, monitoring and correcting, searching for and using information); thinking *beyond the text* (e.g. inferring, synthesising, making connections and predictions); and thinking *about the text* (the reader analyses and critiques the text). All these systems take place concurrently during the reading process. Guided reading[8] offers teachers the opportunity to observe how children read, and to notice and understand the evidence of these processing behaviours. The 'before, during and after' structure of a guided reading lesson gives teachers a way to think about and plan for word solving, and rich discussion of meaning during and after reading. At each stage the teacher uses language to facilitate dialogue with the students and to support analytic thinking (see table below). The critical factor is the expertise of the teacher (Allington, 2013). The precise language used by the teacher facilitates the reader's problem solving power and their ability to initiate effective actions as they become self-regulating readers (Clay, 2001).

[8] Guided Reading Instruction is appropriate for beginning readers, Senior Infants to Second Class

Examples of teacher language to facilitate dialogue	**Examples of teacher language to support analytic thinking**
Searching for and using meaning information: T: *Try that again and think what would make sense*	T: *What did you notice about how the writer told the story?*
Search for and using visual information T: *It has to make sense; does that make sense and look right?*	T: *What did you notice about the way the writer used language?*
Fluency T: *Put your words together so it sounds like talking*	T: *What did the writer do to make (character, topic, plot, setting) interesting?*
Self-monitoring T*: Look for a part you know*	T: *What were three of the most important ideas in this information book?*

Adapted from Fountas & Pinnell, 1996, 1998, 2013.

Reading as thinking; Comprehension strategy instruction, a tool to support thinking or understanding

Reading comprehension is defined as *'the process of simultaneously extracting and constructing meaning through interaction and involvement with written language'* (Snow, 2002, p. 11). This definition encapsulates the current thinking that reading is an active and strategic process and that meaning is constructed as a transaction between reader, text, and activity.

There is a huge body of research in support of explicit comprehension instruction as a means to encourage all learners to develop into critical and reflective readers (Pressley, 2000, 2006; Block & Pressley, 2002; Shanahan et al, 2010). The challenge for teachers is how to successfully modify their instructional methods to reach all learners especially struggling readers or those who have a learning disability. By teaching reading as thinking, teachers can support learners to become active, strategic and critical thinkers. A comprehension strategy is a plan or technique readers use to understand text. Each strategy is not an end in itself but rather a tool to assist with the construction of meaning.

Comprehension strategy instruction offers teachers a meaningful framework to teach students how, when and why to use a range of 'thinking' strategies in order to support the understanding of text. It has two aims – explicit instruction of individual strategies (Duffy, 2002) and teaching for self-regulated strategy use (Block & Pressley, 2002). The five key comprehension strategies considered to be most critical are:

1. Activating background knowledge (predicting)
2. Questioning
3. Analysing text structure
4. Visualising (creating mental images)
5. Summarising

The aim is to teach a small repertoire of strategies over time so readers can use them in a self -regulated fashion to enhance comprehension.

Thinking about what they are going to read beforehand, clarifying the purpose for reading, overviewing the text/chapter, activating prior knowledge and making predictions about the text has been shown to improve comprehension. During and after reading strategies include – noticing how the text is organised/ structured; creating summaries (oral summaries, visual summaries, written summaries); checking for understanding/clarifying and using 'fix up' strategies to better understand the topic (Neufeld, 2005). Skilled readers use a range of different strategies to construct meaning while reading and this can be applied to all subjects across the curriculum. Explicit teaching of each of these comprehension strategies is considered necessary but multiple strategy instruction is considered to be more effective. Two models of multiple strategy instruction are outlined below:

Collaborative Strategic Reading is particularly effective for struggling readers as it integrates word identification, reciprocal reading and cooperative learning (Klingner & Vaughn, 1999). Students work in collaborative groups as they

preview (predict, brainstorm); click and clunk (identify word level challenges, apply fix up strategies); get the gist (main ideas); wrap up (develop and answer questions, review new learning). Each process or strategy is explicitly taught with teacher modelling, then with gradual release of responsibility, all the strategies are combined.

Reciprocal teaching is another example of multiple strategy instruction, and combines the strategies of predicting, clarifying, questioning and summarising (Palinscar & Brown, 1984). The teacher and students discuss the text and co-construct their understanding as they use the strategies of predicting, clarifying, questioning and summarising. The teacher begins by taking a lead role – demonstrating, modelling and providing feedback as s/he gradually releases responsibility to the students. The students then take turns leading the discussion and teacher gradually releases control to the students. Central to reciprocal teaching is the notion of scaffolding where the supports are adjusted to meet the needs of the learner (Vygotsky, 1978).

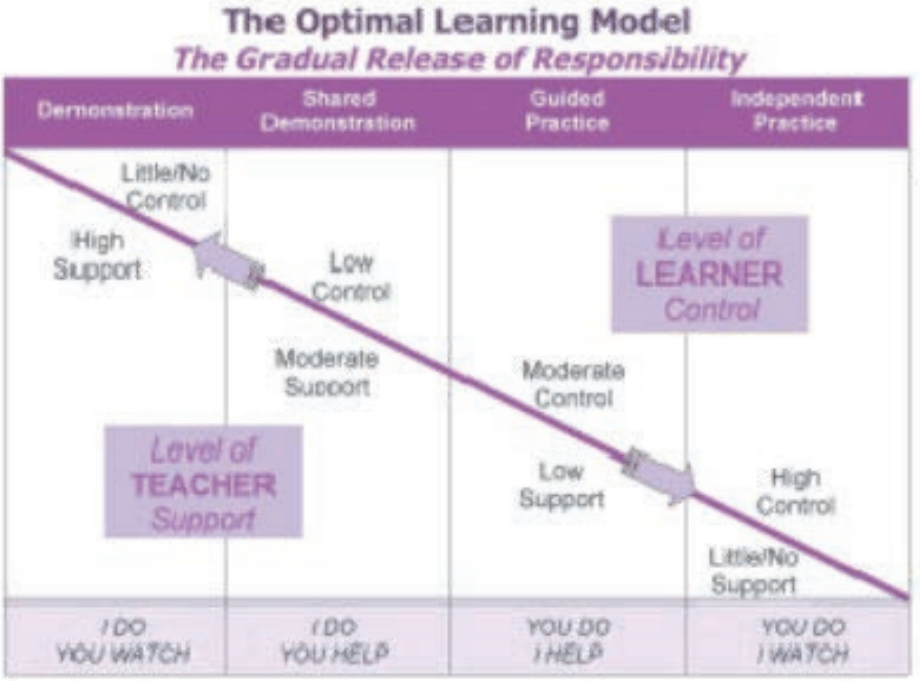
Explicit strategy instruction makes differentiated instruction manageable and meaningful for teachers. By keeping the focus on what is to be taught to all students, the learning difficulties become professional challenges for teachers. Multiple strategy instruction is a practical approach to support all students reaching the goal of comprehension.

Effective instruction for All – A Gradual Release of Responsibility Model

A model of comprehension instruction best supported by research is a five step gradual release of responsibility model conceptualised by Pearson & Gallagher (1983) as follows – explicit description of the strategy and when and how it should be used; teacher and/or student modelling the strategy; collaborative use of the strategy in action; guided use of the strategy with gradual release of responsibility; independent use of the strategy. This model offers teachers an approach to differentiate the *process* of instruction, offering scaffolds to groups of students as needed.

The graphic opposite illustrates how this process moves from a high level of teacher support to little or no support and a high level of learner control. The teacher's role is to model, demonstrate and think aloud in a task where the learner is challenged. This can be understood as *I do you watch; I do you help; You do I help; You do I watch.*

Pupils who struggle with reading comprehension, or who have limited experience of reading for meaning, will benefit from this approach. The explicit teacher modelling and demonstration and the built in scaffolding, supports pupils as they move towards independent practice. In fact, the teacher may use this model in a recursive way as students need more or less support during



Source: *Fisher & Frey, (2008)*

instruction. For example, English language learners may benefit from more time at the first stage- demonstration/shared demonstration (I do, you watch, I do you help). Thinking beyond the text may present a difficulty for some students and they may need extended periods of guided practice (in pairs, small groups). On-going assessment and monitoring how students are using the comprehension strategy will inform teacher's planning. Using a gradual release of responsibility approach maintains the focus on what is to be learned by all (*e.g. to find main idea, to infer, summarise*) rather than providing something different for some learners.

Conclusion

This paper is an attempt to show how the language of differentiation shares many of the guiding principles and key components of inclusive pedagogy and universal design for learning.

Although there is a commitment to inclusive practice within our schools, I believe there is a need to further explore teachers' understanding of inclusive pedagogies in the classroom. Differentiation continues to present difficulties for teachers and this is more than just a question of language. Powerful literacy

practices such as Guided Reading and Comprehension Strategy Instruction illustrate how the class teacher can create opportunities for all learners from the outset of the lesson. The essence of differentiation is about the *process* of teaching and learning -the Gradual Release of Responsibility Model gives teachers a framework to differentiate the process of learning for all. It is hoped this article will stimulate more discussion on teachers' understanding of differentiated instruction in the classroom.

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