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Chapter 16 in Spirals of Change: Educational Change
    as a Driving Force for School Improvement.
    Leuven, Belgium: Lannoocampus publisher
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A strategy and support at school level

Margaret Farren
Mairéad Ryan
Bernie Tobin
Dublin City University

1. Abstract

The need for strategies and supports at school level to facilitate implementation of curriculum innovation and change has long been recognised. Teachers need the opportunity to develop a clear understanding of the innovation, to be given time to become convinced of its value and of its potential to make a difference in terms of pupil learning. This paper outlines how teacher-researchers working within the Irish context carried out research into their own practice in order to bring about improvement. In aiming to understand and inform their practice as teachers, action research was the preferred approach to enquiry in both schools. Bernie Tobin is an Assistant Principal in a primary school. Her research focuses on the implementation of the approach to writing outlined in the English Language Curriculum. Mairéad Ryan, at the time of the study was a classroom teacher but is now a school Principal. She investigates the use of games in a junior primary school. Margaret Farren is a teacher educator at Dublin City University. She explains the methods used to ensure the validity and rigour of the case studies. These include: Whitehead's (1989, 2004) action research cycles; Habermas' (1976) social validation and Winter's (1989) criteria of rigour.

2. Introduction: The Irish context

Arising from the recommendations of the Review Body on the Primary Curriculum (1990), the National Council for Curriculum and Assessment (NCCA) was invited by the then Minister for Education to initiate a revision of the 1971 Curriculum, which involved all partners and interests in primary education. A revised Primary School Curriculum was launched in September 1999. It represents a major departure in the history of primary education in Ireland, reflecting the economic, social and cultural developments in Irish society and promoting teaching and learning approaches, which will cater for the needs of the child in the modern world.

While the revision of the curriculum was the responsibility of the NCCA, the Department of Education and Science, through the Primary Curriculum Support Programme (PCSP), is responsible for providing a programme of in-career development for teachers to ensure the changes are disseminated and implemented. This happens through in-service for whole-school staffs, arrangements for school-based curriculum days and the provision of curriculum support services. The multi-year implementation plan is overseen through the Inspectorate. The challenge for

school management is to put in place structures and procedures to support teachers in the actual implementation of the curriculum in the classroom.

3. Knowledge Base of Practice

Issues around knowledge and how teachers can contribute to a knowledge base of practice are evident in contributions to the journal 'Educational Researcher'. Snow (2001) wrote the following in her article, 'Knowing what we know: children, teachers, researchers'.

The Knowledge resources of excellent teachers constitute a rich resource, but one that is largely untapped because we have no procedures for systematizing it. Systematization would require procedures for accumulating such knowledge and making it public, for connecting it to bodies of knowledge established through other methods, and for vetting it for correctness and consistency. If we had agreed-upon procedures for transforming knowledge based on personal experiences of practice into public knowledge, analogous to the way a researcher's private knowledge is made public through peer-review and publication, the advantages would be great.

<div align="right">(Snow, 2001, p. 9).</div>

In June/July (2002) Hiebart *et al.* wrote in their article 'A knowledge base for the teaching profession: what would it look like and how can we get one?'
To improve classroom teaching in a steady, lasting way, the teaching profession needs a knowledge base that grows and improves. In spite of the continuing efforts of researchers, archived research knowledge has had little effect on the improvement of practice in the average classroom. We explore the possibility of building a useful knowledge base for teaching by beginning with practitioners' knowledge. We outline the key features of this knowledge and identify the requirements for this knowledge to be transformed into a professional knowledge base for teaching.

<div align="right">(Hiebart *et al.,* 2002, p 3)</div>

The knowledge bases already exist, for example, Jack Whitehead's website at the University of Bath, UK at http://www.actionresearch.net; Jean McNiff's website at http://www.jeanmcniff.com; Margaret Farren's website at http://webpages.dcu.ie/~farrenm; the Ontario Action Researchers at http://www.unipissing.ca/oar and Moira Laidlaw's accounts from China and Guyuan at http://www.bath.ac.k/~edsajw/moira.shtml

4. Action research for change

In aiming to understand, inform and improve our practice as teachers, an activity which is 'made up of complex layers of meanings, interpretations, values and attitudes' (Hitchcock and Hughes, 1995, p. 26). Whitehead's 'living educational theory' approach to action research is the preferred approach in both schools. Whitehead sees education as a value-laden activity and refers to values as those qualities, which give meaning and purpose to our personal and professional lives. He suggests that in asking questions of the kind, 'how do I improve what I am doing?' (Whitehead, 1989, 2005), practitioners can create their own theory by embodying their educational values in their practice.

Carr and Kemmis (1986, p. 162) describe action research as a self-reflective enquiry undertaken by participants in social situations 'in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out'. It is a form of practitioner research where there is professional intent to intervene to improve practice in line with values that are rational and just, and specific to the situation. The intervention is in a form of systematic, deliberate cycles of planning, acting, reflecting and analyzing; action followed by research followed by action, over a period of time. It allows for responsiveness to the situation, to the participants and to their growing understanding or consciousness raising, actively involving them in their own educational process. Action research, as Carr and Kemmis (1993, p.237) state, 'helps practitioners to theorize their practice, to revise their theories self-critically in the light of practice, and to transform their practice into praxis (informed, committed action)'. Accordingly McNiff (2002) reminds us that there is no such 'thing' as action research. It is not a set of procedures that are applied to practice rather it is a living process. It is a living process, thus our emphasis on a 'living educational theory' form of action research.

5. A living theory approach to action research

From the late 1970's Jack Whitehead has been committed to an action research approach which he calls 'living educational theory'.

In the development of a living educational theory approach Whitehead (2004, p. 2) offers the following five ideas.
 i). That one should include 'I' as a living contradiction in educational enquiries of the kind, 'How do I improve my practice?'
 ii). That one should develop systematic forms of action enquiry including 'I' as a living contradiction.
 iii). That one should seek to create and test living educational theories as explanations for learning in educational enquiries of the kind, 'How do I improve my practice?'
 iv). That one should devise a process for clarifying the meanings of embodied values in the course of their emergence in practice and for transforming embodied values into living and communicable standards of educational judgement.
 v). That one should identify ways of influencing the education of social formations through the creation and testing of living educational theories in a range of cultural and social contexts using multi-media representations.

Whitehead (1989) has formulated the following action reflections cycle for presenting claims to know one's educational development as one investigates questions of the type; 'How do I improve the process of education here?'

☐ I experience problems when my educational values are negated in my practice.
☐ I imagine ways of overcoming my problems.
☐ I act on a chosen solution.
☐ I evaluate the outcomes of my actions.
☐ I modify my problems, ideas and actions in the light of my evaluations...(and the cycle continues).

Whitehead has further refined the above planner into the following action plan (McNiff & Whitehead, 2002, p. 72):

☐ What is my concern?
☐ Why am I concerned?
☐ What do I think I can do about it?
☐ What will I do about it?
☐ How will I gather evidence to show that I am influencing the situation?
☐ How will I ensure that any judgements I make are reasonably fair and accurate?
☐ What will I do then?

6. Case Study One: Bernie Tobin

An examination of the implementation of the English curriculum in an Irish Primary school – a management perspective

6.1 School context

This is a co-educational school, catering for children from four years to twelve years of age. Currently, the school has twenty-four teachers on staff, including an administrative principal and eight learning-support teachers.

From the outset, the Principal's leadership style has been to develop the capacity and commitment of his staff by encouraging teachers to become involved in the work of the school outside of the classroom. Hence, staff involvement in decision-making is facilitated through consultation and teamwork, in planned and informal contact. While in-school management structures endorse clearly defined, and mutually agreed, instructional leadership and curriculum development roles of post-holders, leadership is seen as something widely distributed throughout the school. Collective skills and experiences are shared and utilized, affording the opportunity for professional growth and development and creating a capacity for change.

It is in this context that school development planning was introduced as a strategy to facilitate the management of the implementation of the revised curriculum. To achieve the learning outcomes in the classrooms, as listed in the revised Curriculum Guidelines, it would concern the integration of three key foci advocated by Hopkins and MacGilchrist (1998, p. 414):

- pupil progress and achievement;
- the quality of teaching and learning; and
- management arrangements to support the first two.

Consensus determined that an English Language audit be carried out as part of the school development planning process to gauge the extent to which existing policy and practices met the guidelines of the revised English Language Curriculum. Subsequent planning aimed to sustain the strengths, while weaknesses in practice were prioritised for planning for implementation. Action plans were drawn up to facilitate the implementation of specific oral language objectives. Future action plans would concentrate on the writing process in order to further develop the child's expressive and communicative abilities. Accordingly, the need to review current practice in teaching the writing process provided the general idea of this enquiry.

As part of the senior management team, I share responsibility for the effectiveness of overall management and administration of the school. In addition, as curriculum co-coordinator for the junior classes (4 years - 8 years) of the school, I have specific responsibility for advising on the English Language curriculum. The internal conditions of the school enabled me to introduce action research as a strategy in the early implementation phase of the targeted oral language objectives. It is in this context that I proposed to continue to use action research in working with teachers to develop and implement a strategy to improve the teaching of the writing process in the junior classes of the school.

6.2 The personal side to change

I believe that change is an extremely personal experience. For me, the change in the approach to teaching writing as a process was an issue that impinged on my work not only as curriculum coordinator but also on my own classroom practice. Having taught children with general and specific learning difficulties, developing competence and confidence in using language is of great importance to me. As a teacher of Infant children I appreciate the reciprocal nature of reading and writing and I wanted to integrate the literacy experience for the children.

The established process of school development planning allowed me to approach the group of teachers, with whom I work on a regular basis, with the certain knowledge of their willingness to examine practice. However, I needed to understand the perspectives and perceived needs of my colleagues, as they began to attempt to implement this change in their practice. My questions concerned the reason for teacher involvement, their concerns and expectations and the adequacy of existing professional support in implementing change.

6.2.1 The reason for teacher involvement

Some of the teachers had become involved because the issue was relevant to their practice. They wanted to investigate and develop a more structured approach to the teaching of the writing process and to integrate it into their existing curriculum. However, only four of the teachers acknowledged that this had been one of the long

time priorities of school as a whole. Others, new to the school, had become involved because they had been asked by me to do so.

6.2.2 Teacher concerns

Teachers highlighted concerns about the demands of the process approach to teaching writing, and how it could be integrated into an already busy day. Others were apprehensive about the management of this process in a whole class situation, in which the children would be allowed to work at their own pace, and yet challenged and helped to develop their writing skills appropriately. While the reciprocal gains on the children reading were to be expected, teachers were concerned about the relevance of the writing process for very young children. It seemed that they needed the opportunity to develop a clear understanding of the innovation, to be given time to become convinced of its value and of its potential to make a difference in terms of pupil learning.

6.2.3 Teacher expectations

Expectations focused on developing a structured approach to teaching the writing process that could be used throughout the school in a developmental way, by collaborating and cooperating with others. The potential for further developing collegial awareness; a readiness to learn from and work with colleagues, and a willingness to share expertise and experiences was anticipated. Non-contact time was seen as necessary to facilitate this. I spoke with the principal about the possibility of releasing the teachers from their classes to facilitate meetings. He agreed and proposed that he and the learning-support teachers would supervise the classes to facilitate this

6.2.4 The adequacy of existing professional support in implementing change

It was felt that the review and planning process, as part of school development planning, had affirmed good practice and had enabled teachers to take ownership of the revised English Language Curriculum. Four of the eight teachers had participated in the previous action research study during the earlier implementation of oral language objectives. This process was described as being hard work, but the benefits of trying out ideas, feeding back to the group and learning from the experience of colleagues were acknowledged. Few mentioned the in-service provided by the PCSP as being important in preparing them for implementing change.

6.3 A general plan

The group's perceived needs in implementing the targeted objectives were ascertained. On-site training would be given to the group; a theoretical background and ideas to help create an environment to foster writing would provide a starting point for the implementation of the objectives in the classrooms. Feedback would be facilitated in regular meetings, time for which had been allocated to the group by the principal.

However, time had elapsed since we had conducted the initial audit on our English Language Curriculum. We needed information on current practice. Audit documents

pertaining to the writing units of the curriculum were circulated to the teachers to provide them with the opportunity to reflect on their practice, assessing strengths and weaknesses, and to pinpoint areas of concern to be addressed. This led to a clearer picture of current practice in the writing curriculum. Not only had specific objectives been targeted but we also had been given an opportunity to reflect on what we value in terms of children's writing.

Literature from the National Writing Project (UK), Perceptions of Writing (1990), documenting children's perceptions of writing and how these were a catalyst for changing the writing curriculum, prompted us to question the children's writing experience and their perceptions of those experiences. Questions suggested for use were adapted from Perceptions of Writing (1990, pp. 9-20), with each teacher selecting questions appropriate to his or her class.

6.4 Monitoring implementation and effect - reflection in action and on action

The quality of the working relationships of teachers is strongly related to implementation of any innovation or change of practice, for according to Fullan (1991, p. 132) 'the more teachers can interact concerning their own practices, the more they will be able to bring about improvements that they themselves identify as necessary'. The facility to experiment in the classroom and to provide feedback to the group was an identified need of the group of teachers. This was facilitated by regular 'supportive work-in-progress discussions', as described by Cohen et al. (2000, p. 237), in referring to Kemmis and McTaggart (1992), time for which had been allocated by the Principal.

6.4.1 Understanding the writing process

Feedback initially saw us grapple with certain aspects of the writing process. Writing topics had been generated with the children. As teachers, we became aware that writing from real experience or on a topic of high interest facilitates opportunity for the children to have ownership of their writing. While initially this was threatening for a teacher if he or she felt lacking in knowledge of the topic, it was recognised that this allowed the children the opportunity to take responsibility for what they know. However, the repeated use of the same topic by an individual was a cause of concern for one of the Infant teachers. An exchange of ideas showed that the teacher may need to prompt the children to help them explore ideas or at times to direct them to a new topic, and that encouraging the children to share their writing would 'spark off ideas' and generate new topics. Similarly, discussions on the prewriting stage of brainstorming clarified this as the generation of ideas as distinct from the planning stage, which we defined as structuring ideas and allowing the whole text to emerge before drafting a piece of writing.

6.4.2 Children's perceptions of writing

Analysis of the children's perceptions of writing revealed that the nature of our interaction with them had significantly affected their view of writing. We learned that in the Infant classes, while some were confident in their ability to write, they

generally identified family and friends as writers. Whereas, the children in First and Second Classes not only perceived themselves as writers, they also had an awareness of authorship and public writing. Their reason for writing varied from it being a fun activity to it being a means of communication with friends and in the work place.

Their understanding of writing for learning also emerged. However, in defining what it means to be a good writer, the children in the First and Second classes were definite about the accuracy of spelling and neat handwriting as being important. While they seemed to be aware if they were good writers or not, they only saw themselves developing as writers because they were '*able to spell hard words*' and were '*good at copying from the blackboard*'. Consequently, later discussions highlighted the importance of first emphasising the content and the expression of their ideas in their work as opposed to editing for conventions of writing.

In considering our response to the children's work, a shared understanding of conferencing at this initial stage of the process emerged, as focusing on what the writer can do rather than not do. A simple structure for conferencing with the children was agreed in which the content of their writing, as opposed to the conventions of writing, was emphasised. It was suggested that a positive comment be made about the work and when necessary, one be able to write freely and not be preoccupied with accuracy at this early stage. Editing is seen as being a later stage in the process, in which the children could improve their spellings and handwriting in readiness for publication of their work. However, at this early stage in the process, it is felt that if the children want to publish, the teacher would edit the work and they then copy the corrected version.

6.4.3 Implementation in the classrooms

6.4.3.1 The writing workshop approach

Clay (1991, p. 112) acknowledges that 'Organizationally it is difficult for teachers to be everywhere at once and continually available to help with writing, but there are many solutions to this problem'. The use of the writing workshop model (Atwell, 1998, p. 28) as a teaching strategy epitomised the approach with the older children, although the level of implementation varied from class to class at this stage. This is a whole class teaching session where all the children are engaged in the different writing activities at the same time. Teaching can happen at the beginning of the session, in the form of mini-lessons, in conferences with individual children throughout, and in sharing time at the end of the session.

6.4.3.2 Emergent writing in the infant classrooms

It was recognised that writing in the Infant classrooms differs from the workshop approach to writing adopted in the First and Second Classes. Here the emphasis was on the emergent writer and learning to write. Writing areas were used to encourage the children to write, in an area where all necessary resources are to hand. However, as Wyse (1998, p. 23) explains that the practice of the writing workshop 'can be modified for infant children', we also involved the children in whole class writing

workshops. The teacher modelled the writing behaviours, conferred with one group of children a day and acted as a scribe to record the children's ideas

6.5 Educational impact on teaching and learning

McNiff (1988, p. 4) describes action research as an 'approach to improving education through change, by encouraging teachers to be aware of their own practice, to be critical of that practice, and to be prepared to change it'. For us, this began with 'dialectical critique' and 'risk disturbance' (Winter, 1996, pp. 13-14, cited by Cohen et al. (2000, pp. 228-229)), in acknowledging that our educational values for the children's writing experience were not being lived in our practice. Action research allowed us to change our practice and to accommodate new ideas through collaborative dialogue and reflection. While theory initially informed our practice, we developed our own personal theories of education from practice, acknowledging, that theory and practice are two interdependent yet complementary phases of the change process (Winter, 1996). In this way we have managed to live out these values in our practice, developing a strategy to improve the teaching of the writing process.

A stimulating print-rich environment in the classroom helps created a purpose for writing, but teachers learned to create the highly structured and predictable environment necessary for the writing development of the child. This means a writing workshop approach in which writing is taught as a craft. Teachers needed to enable children to know what to expect in terms of time given for writing, when and what to expect in the conference time with teacher or peers, and what to do when stuck for an idea or when finished writing on a topic.

We learned that the nature of our interaction with the children had significantly affected their view of writing and their success in their learning attempts. Our teaching is now 'characterised by a highly interactive teaching and learning dynamic' (Meaney, 2000, p. 198). We now understand that writing is a complex activity process, linked to skills of oral language and reading, which requires reflective thought and is used to communicate purpose and meaning. Teacher modelling and oral discussion have helped the children to begin to use the thought processes necessary for every stage of the writing process. Central to this approach, we learned, is the pupil-teacher conference, in which teachers scaffold the children's writing attempts and through which dramatic changes were seen in children's writing. This also facilitated the monitoring and assessment of progress, the children's involvement in which is seen as important, and so helped 'plan the contexts, strategies and content that will contribute most effectively to their learning' (English Language Teacher Guidelines, 1999, p. 93).

The value we placed on the process of writing and expression of ideas, as much as the written product, had achieved its intended effects. Children now know writing-as-a-process, expressing ideas first and then managing the conventions to share these ideas with a wider audience in a final draft. Teachers noted that the children, in particular those with learning difficulties and who lacked confidence, wrote freely because they had learned that the first emphasis was placed on getting their ideas down on paper. No longer were they anxious about the conventions of writing, they *weren't afraid to make mistakes'*. In this way they had come to realise that the

primary function of writing is to communicate or express ideas. Later, in the editing process they learned if the conventions of writing were not attended to, then the clarity of the writing can be affected. These skills however were learned in the context of their own writing.

As a form of expression, writing had given the children further opportunity to communicate with others, developing a sense of authorship and audience. Although it was recognised that some children continued to have difficulty in knowing what to write, they all had topics of interest that they wanted to write about. In choosing topics for writing, the children were helped to value their own experience and knowledge as worthwhile writing material.

The children had come to learn that writing, as Graves (1990, p. 27) describes 'is a social act'. They were willing and enthusiastic to share their writing, whereas previously, as one teacher explained, '*it was mainly the brighter people in the class that would volunteer their story'*. Teachers spoke about children working in pairs to generate ideas and compose text together. But most importantly they noted that the children began to appreciate that sharing of ideas is helpful in clarifying thought. Not only did this build a developing sense of audience, but it also gave them 'an early appreciation of the benefits to be gained from co-operative efforts' (Primary School Curriculum: Introduction, 1999, p. 17).

6.6 Driving and constraining forces of change – lessons learned

Being characteristically situational, this action research concerned a current 'problem' in our specific context, in which the internal conditions, management structure and supports allowed teachers to work together to reflect on practice, leading to understanding and improvement. Reflexivity in action research insists on modest claims from judgements made from this personal experience, but these have been validated through collaboration with other teachers, and in my own participation in a validation group with co-action researchers. Others, taking their particular contexts into account, may be able to use its findings.

Leadership is seen as something widely distributed throughout the school, and central to this leadership is the empowerment of others. As curriculum coordinator I have found that my role is not only to involve, support and empower others as we seek to improve practice, but also to provide a pressure point for positive change, which is different from exerting control. This concurs with Fullan (1991, pp. 105-107) who notes that 'people need pressure to change (even in directions that they desire)'. But he stresses that this 'will only be effective in conditions that allow them to react, to form their own position, to interact with other implementers, to obtain technical assistance'. An environment conducive to learning is therefore necessary in the creation of shared meaning and coherency in dealing with change. It is only by being prepared to question our practice in a collective, deliberative and democratic way that the *raison d'être* for change can become clear. It is the opportunity to focus on the *why* and *what* of change (see Freding and Tobin earlier in this volume) that the will to actually do something is created and motivation from the belief that what one does can make a difference is enhanced. The 'sustainability of change depends on having people with the problem internalise the change themselves' (Heifetz and Lynsky, 2002, p. 13).

The differing needs and concerns of staff, determine the necessity of support for professional development. On-site training in the early stages of this study provided an understanding of the theory of the writing process and initially informed our practice. Yet in recognising processes of personal adaptation that inevitably accompany change or difference in practice (Whitaker, 1997, p. 23), in-service training could also include demonstration of good practice by staff with expertise, peer coaching and observation. It is also important to use external structures to the school to support capacity building in managing change. Collaboration with other schools and colleges, as was the case in the initial stages in this study, will prevent the danger of becoming introspective.

The facility to experiment in the classroom and to provide feedback to the group is another identified need of teachers. Time to work collaboratively in small groups to reflect on, understand, inform and evaluate practice must be made available. This opportunity to try out ideas and to reflect on their effect, helps to clarify what is entailed in improving practice, as one teacher remarked, *'I came out of it knowing well I tried that and that didn't work and that did'*. Teacher learning can thus be directly linked to the learning of the students.

By being actively involved in the process I have gained some insights into the necessary conditions which encourage positive attitudes to the introduction of new ways of working. I also know that we should not only be concerned with the technicalities and skills assumed by the change process itself. We should endeavour to build on collegial awareness to move towards combining, as Fullan (2003, p. 14) describes, 'moral purpose, engagement with others and the ideas and resources' to develop as a professional community with a capacity to sustain change.

7. Case Study Two: Mairéad Ryan

An examination of the implementation of the Mathematics curriculum in an Irish Primary school – a teacher's perspective

7.1 School context

This is a junior school which caters for children between the ages of four and eight years. Teaching staff includes an administrative principal, a deputy principal, an assistant principal and thirteen assistant teachers. A resource teacher and a remedial teacher provide learning support for children with special needs who are integrated into mainstream classrooms. There is also provision for language support for non-national children.

 There is a middle management structure in place consisting of a deputy principal, an assistant principal and six special duties teachers. Teachers were appointed to middle management positions on seniority. The style of management aspires to a collegial model where power and decision-making should be shared among members of the organisation. Bush (1995, p. 59) considers this model as the most appropriate way to manage primary schools. Collaborative working relationships between teachers and their colleagues tend to be spontaneous, voluntary, informal, and geared to

development. The principal allows each teacher sufficient discretion in the classroom in the approach to their teaching methodologies. She values collaboration and encourages the teachers of each class group to work closely together to implement the curriculum. She is always supportive of new ideas to improve the quality of education being provided for the young children attending the school. Working groups are established to review curricular areas. The decision-making processes within these working committees as described by Bush (1995, p. 63) strive to be 'egalitarian with influence dependent more on specific expertise than on official position'. Teachers who have an authority of expertise are encouraged to share innovations with colleagues. Year group teachers meet regularly to plan collaboratively to ensure a consistent approach to teaching.

The introduction of the revised primary school curriculum in 1999 reflects the child-centred vision of education that was a striking feature of the last major review of the primary school curriculum in 1971. Active learning experiences for children are envisaged which will make learning interesting, enjoyable and fulfilling. The area of the curriculum that is examined is mathematics. Constructivist learning is presented as central to the revised mathematics curriculum. In facilitation of curriculum implementation this enquiry introduces mathematical games as a learning strategy to enable children express mathematical thinking and understanding.

7.2 Teacher perspective

The implementation of the revised curriculum involves a collaborative planning process. 'Special talents of the staff in areas of the curriculum and expertise in implementing innovative programmes can be identified and merged to support the change process' (Primary School Curriculum: Introduction, 1999, p. 64). As a teacher in the school I have particular interest in Mathematics and how children understanding of Mathematics can be enhanced through the use of mathematical games. Educational change involves changing teachers' beliefs and understanding as a prerequisite to improving teaching practices. The initial task begins with establishing a shared understanding and vision of education as is communicated in the revised primary curriculum. This applied to practice translates as the visualisation of the school as providing experiences that embody the aims of the primary curriculum. An understanding of the meaning of educational change is required before there is an acceptance and adoption of new programmes and approaches.

7.3 Improving teaching and learning

Arising from interest in mathematics and mathematics education I was concerned that a systematic and reflective approach be undertaken to implement the mathematics curriculum. I facilitated the implementation of the revised mathematics curriculum in the school where I taught. I developed a particular focus on providing learning experiences for children to learn mathematics with understanding. In facilitating curriculum change I endeavoured to clarify the meaning of my educational values as they emerged in practice and became my living standards and to share my living standards with others by facilitating a process that engaged teachers in professional dialogue with the intention of improving practice. Curriculum change in mathematics encompassed the following key elements:

engaging in professional dialogue to establish a shared understanding and vision of a mathematics education, recognising the centrality of children in the learning process, encouraging participation in curriculum change by providing support and advice and ultimately developing a framework for action that would guide the implementation process. 'The implementation of the Primary School Curriculum provides schools with a unique opportunity to enhance the quality of educational provision' (Primary School Curriculum: Introduction, 1999, p. 62). As facilitator I communicated my educational values as I lived them in practice, which motivated colleagues to participate in the change process. In an effort to enhance the quality of provision for mathematics education in my school, a collaborative working relationship between the teachers participating in the process evolved which was informal, enjoyable and productive.

7.4 Driving and Constraining Forces of Change

The aims of the primary mathematics curriculum were presented to all the teaching staff at an in-service training day. The training involved active participation in activities and games recommended for use by children in the classroom. This active participation aided the change process that followed in the classrooms. Teachers recognised the value of using these strategies to enable children to develop mathematical skills.

Dialogue among the teachers revealed that time away from the classroom is needed for familiarisation and assimilation of an understanding of the curriculum. They believed that in-service training was inadequate to develop the necessary understanding to move the change in the right direction. Fullan (1992, p.112) outlines the following three factors (each of which was evident in my school) that relate to the characteristics of change: need, clarity and complexity.

Need: Teachers frequently do not see the need for the advocated change. There is also difficulty in prioritising needs among a set of desirable needs.

Clarity: When there is agreement that some kind of change is needed, clarity is essential. An oversimplification of the interpretation of the change results in false clarity. The main feature of the change in the curriculum is in methodology and because there is no major change in content it may be dismissed on the premise that that 'we are doing this already'. This perception also makes explicit the emphasis on content to the neglect of the salient emphasis on process.

Complexity: Change requires an array of activities, structures, diagnoses, teaching strategies and philosophical understanding if effective implementation is to be achieved.

Elliott (1991, p. 16) recognises the centrality of teachers as researchers in curriculum development. Stenhouse claims that there can be no curriculum development without teacher development. Proactive participation in the process will lead to a sense of ownership and empowerment. A starting point for this participation is a belief that curriculum change will enhance children's education. This belief is dependent on understanding the principles underlying the change and reconciling them with existing attitudes and values. A team was formed by four teachers who were willing

to become researchers in curriculum development in their own classroom: exploring the use of games as an approach to enable children to express their mathematical thinking and understanding.

The underlying principles of the revised mathematics curriculum based on a philosophy and psychology of teaching and learning were presented at mathematics curriculum in-service. The skills spanning the content of the curriculum that is envisaged the children will develop were mentioned. The child-centred nature of the mathematics curriculum was emphasized and in particular the role of play in learning. The rationale for using games and activities was clearly communicated. Teachers engaged in some mathematical games and activities.

 A meeting was held with the teachers participating in the study to reflect on their thoughts of the recent in-service training. The activities and games were especially enjoyed and it was conceded that we should be doing a lot more. The positive comments revealed an understanding of the benefits of games and activities. The negative comments were concerned with organisation of resources, pupils and record keeping. I identified my values to the research team: implementation of a mathematics curriculum that promotes children's understanding, accommodating individual differences among the learning styles of the children, promoting the role of social interaction in developing mathematical understanding and recognising the interactive nature of teaching and learning which requires active engagement with children to elicit understanding in order to plan appropriate instruction.

Above all I communicated that I was concerned that a systematic approach be taken to curriculum implementation that engages teachers in professional dialogue about their practice. According to Fullan (1992, p.117), 'some teachers, depending on their personality and influenced by their previous experiences and stage of career are more self-actualised and have a greater sense of efficacy, which leads them to take action and persist in the effort required to bring about successful implementation'.

A strand of the curriculum was prioritised for the focus of the study. This emerged following a review of the introductory chapter of the curriculum. 'One of the causes of failure in mathematics is poor comprehension of the words and phrases used. Some of the language will be encountered only in the mathematics lesson, and children will need many opportunities to use it before it becomes part of their vocabulary' (Primary School Curriculum: Mathematics, 1999, p. 6). The general plan was to explore the use of games involving the language of comparing and ordering numbers to enable children to express their mathematical thinking and understanding using this language and thereby contribute to the children's development of number relationships. Suitable games were selected from Kamii (2000, pp. 144-194) and Wrigley (1999, pp. 17-45). I briefly reviewed the skills development checklist and recommended to document any observation of the notable development of any skill. Clarification of some skills were sought. I demonstrated the games at our meeting.

The next meeting provided an opportunity to discuss the experiences of the using games in the classroom, to establish if there was a shared understanding of the skills that the curriculum aims to develop and to also establish if the development of these skills are easily identified among the children while playing the games. Each teacher

outlined their approach to using the games. It varied from a single group playing a game to the whole class. The social construction of learning was highlighted. There was general agreement that the children really enjoyed playing. In some classes children played the games during indoor break time in the classroom.

Observing the development of skills proved quite problematic. Difficulties that emerged included: understanding of the terminology of the skills, the number of skills listed and monitoring the skills. The teacher of second class said, '*sometimes I'm there saying what does that mean, guessing, I'm not sure if I'm right. You couldn't possibly monitor and record while they are playing and afterwards it is difficult to think back*'. She was of the opinion that non-familiarity with the skills resulted in difficulty in recognising their development in the classroom, '*its part of the new curriculum, we haven't really got our heads around the terminology*'. I had not anticipated that observation of the mathematical skills would have been so problematic. This was due to the teachers' lack of clear understanding of these skills and also because of classroom management issues. I applied my knowledge of the skills to learning contexts that the teachers related from their classrooms to develop a shared understanding of the mathematical skills children were developing when playing the game. This discussion clarified my own understanding and my colleagues understanding of these skills. This activity also raised our awareness of the interdependent relationship of the skills as children learn with understanding. Learning mathematics with understanding requires the development of many of these skills simultaneously.

While acknowledging the benefit of using the games at subsequent meetings, there was concern that acquiring the correct resources is problematic. Hargreaves (1994, p. 15) comments that the shortage of time repeatedly appears as one of the chief implementation problems of educational change. He states 'scarcity of time makes it difficult to plan more thoroughly, to commit oneself to the effort of innovation, to get together with colleagues, or sit back and reflect on one's purposes and progress'.

7.5 Educational significance of this research

Opportunity to converse and exchange ideas about the meaning of change plays a central role in determining sustainability. Fullan (2001) contends that 'significant educational change consists of changes in beliefs, teaching style and materials, which can only come about through a process of personal development in a social context'. At meetings we not only learned together how to use a new methodology but to evaluate its effectiveness in the context of improved student learning enabling the development of a collaborative learning community. McLauglin and Talbert (2001) found that 'a collaborative community of practice in which teachers share instructional resources and reflections in practice appears to be essential to their persistence and success in innovating classroom practice'.

This case-study engaged teachers in professional dialogue about improving their practice. Reflection on the philosophical underpinnings of the revised mathematics curriculum based on the most advanced educational theories and practices, was the stimulus to developing an educational enquiry in my school leading to knowledge and understanding of practice. The ultimate aim was to endeavour to improve practice in a cyclical process alternating between action and critical reflection.

Curriculum implementation provides an opportunity to educators to critically reflect on their practice. Participation in the change process ensures commitment to enhancing the education of the children in their care. In this study curriculum implementation involved a collaborative planning process among colleagues where respect, openness, trust and support were valued as teachers participated in the change process.

I identified my role as facilitator of curriculum implementation as that of providing support, advice and sharing my educational values in an effort to enhance the quality of provision for mathematics education in my school. Curriculum implementation process began with a reflection of the underlying principles of the revised curriculum, which places children at the centre of the learning process. A defining feature of the revised mathematics curriculum is the focus on the process of learning. A review of writings on mathematics education emphasised the importance of children learning mathematics with understanding and the need to structure a learning environment in the classroom that supports this kind of learning.

Mathematical games were explored as a strategy to enable children learn with understanding. This strategy highlighted the social nature of children's learning as they expressed their mathematical thinking and understanding to their peers and their teacher. The use of the games identified the interactive nature of teaching and learning which requires active engagement with children to elicit understanding in order to plan appropriate instruction. Individual differences among the learning styles were accommodated. The children were actively involved playing games designed to deepen and connect their understanding. They explained what they were doing and justified their decisions. The children were challenged to communicate their thinking to other children, which clarified their own understanding and also helped to develop other children's understanding. The children were intrinsically motivated and actively engaged in their own learning.

The teachers engaged in the study embraced the challenge of curriculum implementation. As a team we worked collaboratively towards an understanding of the range of skills outlined in the revised curriculum. The learning environment was characterised by trust, openness, respect and a willingness to share insights. The research team created their own learning opportunities by reflecting on their own practice and observing their colleagues practice. The commitment to curriculum change throughout the school was indicated by their willingness to share their experience of using games with other teachers in the school. Evidence of the use of the games as an invaluable assessment tool was presented.

The action research methodology used in this enquiry enabled curriculum implementation that resulted in improvement in learning: children's learning, teacher's learning and my own learning. Effective mathematics teaching requires understanding what students know and need to learn.

Teachers need professional support in understanding the range of mathematical skills outlined in the revised mathematics curriculum. Children's learning of mathematics with understanding is dependent on the development of these skills. Active learning

contexts need to be carefully structured to ensure that these skills are developed with understanding. Teachers need to question skilfully to elicit thinking and understanding in the mathematics class in order to plan appropriate instruction for children.

My report shows evidence that change and improvement in practice has taken place. The fact that I am hopeful that this enquiry will contribute to a living educational theory is taking a personal risk. Theory and practice are mutually dependent phases of a change process, which represents the strongest case for practitioner action research. The theory of the enquiry based in practice is in itself transformed by the transformation of practice.

As practitioners endeavour to improve some aspect of their practice, Whitehead (1989) states 'I believe that a systematic reflection on such a process provides insights the nature of the descriptions and explanations which we would accept as valid accounts of our educational development. I claim that a living educational theory will be produced from such accounts'. This study has produced a validated account of my improved learning as facilitator of educational change and makes the modest claim that it contributes in some way to living educational theory. The study enabled me to: identify my educational values, clarify their meaning as they emerged in practice, transform them into living standards and share my values with other teachers to transform their practice.

8. How do we know that we have improved practice? Margaret Farren

Improving the quality of student learning by improving the quality of teacher learning.

As a higher education educator, I support practitioner-research and encourage educators to critically evaluate their practice. I provide an open and collaborative learning environment for them to articulate the process of their own learning as they provide evidence of how they are improving the learning capacities of the pupils/students for whom they in turn are responsible. The case studies, in this paper, demonstrate how two teachers are improving teaching and learning within their respective schools.

Smith (2001, p. 271) asks, 'Why should it be important to consider the question of what sustains us?' This question suggests that we should reflect on the significance of our values and that in answering the question we would articulate the values that sustain us in our personal and professional lives. We are never finished products. We are always emergent beings with further potentiality. The Irish philosopher, John O'Donohue, believes that community has to be allowed to emerge: "*True community is not produced. It is invoked and awakened. True community is an ideal where the full identities of awakened and realized individuals challenge and complement each other. In this sense individuality and originality enrich self and others*" (O' Donohue, 2003, pp. 132-133).).

Each individual's uniqueness can enrich the community. O' Donohue's conviction that a 'web of betweenness' generated a collective bonus is reminiscent of the economists' notion of 'total factor productivity' – the unexplained residual

productivity created by a combination of favourable factors. O'Donohue's idea of community however extends beyond the social community to the idea of a community of spirit and relates more strongly to my educational values than the economists' residuals: ". I have used the notion of a 'web of betweenness' to refer to how we learn in relation to one another. I see it as a way of expressing my understanding of 'power with', rather than 'power over' others. It is this *power with* that I have tried to embrace as I attempt to create a learning environment in which I, and teacher-researchers, can grow personally and professionally.

8.1 Validation meetings

A validation group is an integral part of action research. The purpose is to develop the capacity of each individual to produce an account of his/her learning and submit it to a validation group in order to strengthen the validity of the accounts and to benefit from the ideas of others on ways to move learning forward. Both Bernie and Mairéad participated in validation meetings throughout the research process.

In guiding the validation process, I keep in mind the general aim of developing each participant's living educational theory, having regard also to Habermas' insistence on social validity. Habermas contends that validation entails ensuring that accounts of learning are comprehensible, that sufficient evidence is provided to justify any assertions, that the background of the account is made explicit, and that the accounts are authentic in that the writer shows over time and in interaction that his/her claims to be committed are turned into reality (Habermas, 1976). He points to the importance of the following four validity claims that are implicit in any communicative transaction and that the speaker must be able to defend.

The speaker claims to be:

- Uttering something understandably;
- Giving [the hearer] something to understand;
- Making himself thereby understandable; and
- Coming to an understanding with another person.

(Habermas, 1976, p. 2)

Habermas' claims pertain to the 'ideal speech situation'. For Habermas, (1976) truth is the outcome of *rational agreement reached through critical discussion*. Winter (2003, p. 144) makes a similar point to Habermas when he refers to collaboration and cooperation as necessary in order to heal the "*distorted or inadequate communication processes that so often limit the effectiveness of professional situations and roles*" (Winter, 2003, p.144). The 'web of betweenness' in the validation meeting is characterized by a process of democratic evaluation. In dialogues, I believe that we attempt to develop our individual educational practices in collaboration with others: "Dialogue is the collective way of opening up judgements and assumptions" (Bohm, 1996). By relating to Winter's six criteria of rigour and Habermas' criteria of validity in the context of validation group meetings, I endeavour to ensure that the action research studies are both rigorous and valid.

9. Conclusion

The recent revision of the primary school curriculum has meant that schools have had to reevaluate their practice in light of changing curricula. In this paper, we show how teacher-researchers used an action research approach in order to bring about change and improvement in teaching and learning. In addition, teacher-researchers have been supported to articulate their own educational values as they develop their living educational theory (Whitehead,1989, 2004) by asking, researching and answering the question, 'how can I improve my practice?' The case studies show how a collaborative and safe learning environment emerged through the course of the research, thus providing teachers with the opportunity to reflect on and articulate their concerns, taking ownership of the change.

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