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ABSTRACT

The Project for Enhancing Effective Learning (PEEL) is a well-established Australian example of teacher collaborative action research. The aim of the project, which began in a secondary school in Melbourne, Victoria (Australia) and later spread to other countries, is to improve the quality of students' classroom learning through practice in purposeful enquiry and to help teachers become more independent and interdependent by enhancing their awareness, responsibility, and control of their teaching. The project uses a collaborative action research model, with regular group meetings among teachers, sometimes supplemented by university academics, to share ideas and experiences and to maintain motivation. The group meetings identify good learning behaviors and then devise specific teaching procedures that foster one or more of the good learning behaviors. The project was felt to be successful because it arose from teachers' own needs and concerns about classroom teaching and learning, teachers remained in control of the project's implementation, and teachers worked together for improvement. The importance of the support of senior school staff and the need for effective training of group leaders are emphasized. The project is being implemented at a Swedish school, with teachers reflecting on their own classroom practice and searching for the meaning behind the decisions they make and the behaviors they exhibit. (Contains 11 references.) (JDD)

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TEACHER COLLABORATIVE ACTION RESEARCH: A SWEDISH ADAPTATION OF
AN AUSTRALIAN PROJECT

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ABSTRACT

The Project for Enhancing Effective Learning (PEEL) is a now well-established Australian example of teacher collaborative action research. The aim of PEEL is to improve the quality of students' classroom learning through practice in purposeful enquiry (by asking evaluative questions about the lesson and about personal learning, and taking appropriate action). Such enquiry assists students to become more independent and inter-dependent learners, more aware of, responsible for, and in control of, themselves and their actions. PEEL is not focussed solely on learning by students, however. Its success is dependent on teachers also engaging in purposeful enquiry (through reflection and action) on their teaching. This purposeful enquiry helps teachers to become more independent and inter-dependent by enhancing their awareness, responsibility, and control of their teaching. PEEL thus involves fundamental professional development of both teachers and their students.

In this paper, we describe some key teacher professional development features of PEEL. We then report how PEEL stimulated the start of a similar project in a secondary school in rural Sweden. The Swedish educational context is compared briefly with that in Australia, and the potential for successful continuance of the Swedish project is considered in terms of these professional development features.

INTRODUCTION - OVERVIEW OF PEEL

The focus of this paper is teacher professional development directed at enhancing quality of classroom teaching and learning. In it are embedded many related notions about effective change, for both individuals and groups. Such notions include: "teacher as researcher"; school-based development; reflection on practice; metacognitive development; collaborative action research; school/university

links. The purpose of the paper is to demonstrate that, if certain conditions exist, these notions can come together productively in order to effect substantive and durable changes to classroom and whole-school educational practices. Based on the experience of successful adoption and adaptation in Sweden (and also in Denmark), these conditions appear to transcend particulars of school and culture.

In 1985, a classroom-based secondary/tertiary collaborative research project began in a metropolitan secondary school in Melbourne, Victoria. The aim of this project - encapsulated in its title, the Project for Enhancing Effective Learning (PEEL) - was to change the nature of students' classroom learning practices in a way that would provide for greater learning success. Over its now ten-year period, the project has spread to large numbers of schools in Australia and overseas, principally Canada and, as this paper will describe, the Scandinavian countries of Sweden and Denmark. Aspects of PEEL have been reported widely, but the two most substantive written products of the project are the two "PEEL books" (Baird and Mitchell, 1986; Baird and Northfield, 1992). Details of the rationale, nature, progress and outcomes of PEEL will not be given here; consideration will centre on particular aspects related to successful adoption and implementation of any teacher-led, school-based project incorporating the method of Collaborative Action Research.

The project was originally intended to "enhance effective learning" of school students in everyday classrooms through providing them with opportunities for and practice in reflecting upon their learning and taking appropriate action in order to generate adequate metacognition (defined as knowledge of the nature of learning and awareness of and control over personal learning practice). Associated with this key metacognitive outcome were associated outcomes of enhanced content understanding and, particularly, improved feelings of self-efficacy, confidence and enthusiasm for learning. Over the period of the project, there is ample evidence for the acquisition of these types of changes by students. Of similar importance for the success of PEEL, however, is the nature of the changes experienced by the teachers. A similar type of metacognitive development as that desired for the students was, in fact, required to be experienced by the teachers in order that they could properly conceive of and work towards appropriate changes in classroom teaching/learning practices. For both teachers and students, the nature of the cognitive/metacognitive and associated affective development usually required a protracted period to allow for changes in attitudes, perceptions, conceptions and behaviours such that participants became progressively both more *willing* and *able* to take effective responsibility and control of their classroom actions (Baird, 1992). For teachers and, to a limited extent for students, the method of Collaborative Action Research was crucial for providing the participants with adequate opportunities, guidance and support for change. Teacher

Collaborative Action Research involved regular (usually weekly) group meetings to share ideas, observations and experiences, to interpret findings and to plan for the future. Particularly, meetings provided a supportive and collegial environment where failures as well as successes could be shared, and motivation maintained for the difficult and demanding processes involved. These regular meetings were often supported by more informal discussions in corridors and staffrooms. In the early stages of the project particularly, this on-going collaboration among teachers was supplemented by collaboration with University academics, who regularly attended school group meetings and occasionally observed lessons. The major contributions of these tertiary people were to provide some conceptual guidance (helping teachers to critically appraise their progress and findings and set them in a wider educational context) but, above all, to provide acknowledgment, recognition and support for the teachers' efforts.

The over-riding outcome of PEEL was that *everyone learned*. Students learned about the nature of learning and how to take more effective control over their own learning. Teachers learned about the nature of teaching and learning and how to take more effective control over their own teaching. University academics learned about the nature of teaching, learning, professional development and the processes of change, and how to participate effectively in classroom research for the betterment of all. For all participants who experienced personal and professional development, this development was stimulated by the associated feelings of enhanced self-efficacy, confidence and enthusiasm mentioned above.

From a professional development and change perspective, the success of PEEL is related to many factors related to its nature and manner of implementation. One such factor is that the major stimulus for the project arose from teachers' own needs and concerns about classroom teaching and learning, rather than resulting from some press for change imposed upon them. Sikes (1992) writes about the limitations of imposed change for generating substantive and durable development, because of the failure to accommodate within the change process the complex nature of the individuals (and thus of these needs and concerns). Another related factor was that teachers remained in control of the project's nature and extent of implementation and, particularly, of the work done in their classrooms. Outsiders seldom entered their classrooms and, if they did, it was not to usurp teachers' sense of control of classroom practices. A third factor was the collaborative nature of the endeavour. The project enabled teachers to work together for improvement in a fashion that overcame teachers' often-felt sense of frustration arising from personal and professional isolation, a condition referred to as

being "in the PITS" (Professionally Isolated Teacher Syndrome)¹. Indeed, for various participants in the project, the guidance and support that were obtained through collaboration with others served as two of the major bases for their increasing enthusiasm and motivation for participation. The last factor to be mentioned here is one again to do with control - this time related to the professional emancipation that arises from the outcome of enhanced metacognition regarding personal practice. While collaboration helped overcome the feeling of being "in the PITS", the understandings about, awareness of and personal control over effective, productive teaching that resulted from participation provided motivation for continuing. We shall return to such factors as those above in a later section.

Other factors related to the school and societal context will influence the nature and extent of success of any school-based initiative for individual and group change, and school improvement. For instance, the period in which PEEL has occurred has been a time of significant change in visions and processes of schooling in Victoria. The rationales and policies underlying some of these changes have complemented the PEEL initiatives (and, indeed, PEEL has sometimes contributed to such rationales, for example with Curriculum Frameworks P-10). Examples of complementary changes include: the increasing attention to school, teacher and student autonomy in educational practices, culminating in the recent Schools of the Future program; the development of the Advanced Skills teacher classifications, which were seen as providing a teacher career path related directly to leadership in teaching and learning; the types of skill development (for both students and teachers) inherent in such curriculum innovations as Curriculum Frameworks P-10, the new Victorian Certificate of Education (V.C.E.), the new Victorian Curriculum and Standards Framework, and even evidenced in such competency-based perspectives as the currently draft form of the National Competency Standards for Teachers that have arisen from the National Project on the Quality of Teaching and Learning.

Changes such as those mentioned, however, have been more than rationale and policy - they have required implementation. In the period of the project, such changes have sometimes interfered with teachers' involvement in PEEL, because they have generated considerable pressure for teachers to understand their nature and determine ways of implementing them (often with inadequate system support). The difficulties have been exacerbated when, as has happened with the introduction of the V.C.E., policy and practice have themselves been the subject of continuing debate and change. Even given this constraint, however, the period has been conducive to the emergence and development of PEEL ideas and practices. Educational system and societal factors have been mirrored by

¹ Bainbridge, J. (1994). Appraisal as an agent of change. Unpublished document.

complementary developments in perspectives and practices in educational research. Increasing interest in such perspectives as the "teacher as researcher", the process of reflection and the importance of reflective practice, and action research all complement PEEL-type research, with its naturalistic, qualitative, collaborative and ethnographic aspects.

We now move to the question that forms a basis of this paper. This question is: how universal are PEEL principles and the PEEL approach, in terms of other schooling contexts and change theory generally? In order to move to an answer to this question, first we shall outline in more detail the nature and extent of changes required of the teachers in PEEL, next discuss some key factors related to its successful implementation, and then consider the Swedish adaptation in terms of these factors.

THE NATURE AND EXTENT OF TEACHER PROFESSIONAL DEVELOPMENT REQUIRED IN PEEL

The ideas presented in this section and the one to follow emerged progressively and, in some cases, unexpectedly as the project developed, and thus the presentation below benefits considerably from the advantage of hindsight.

For teachers, PEEL often requires change in *conceptions* of the nature of effective, purposeful teaching and learning. Such change constitutes part of the teacher learning that is the basis for their professional development. As has been recognised widely, professional development encompasses conceptual change together with change in attitudes, beliefs and classroom behaviours (e.g. Connors, 1991; DEET, 1988). The problem becomes: How to most effectively foster these complex changes in personal and professional attributes and behaviours?. Originally, the aim of the project was to promote a particular view of effective student learning - one that emphasised the need for a process of active, purposeful enquiry leading to an outcome of enhanced metacognition. This process and outcome is constructivist in nature, in that new understandings, skills and attitudes develop most effectively if they clearly relate to existing ones in the mind of the learner. This view is the antithesis of transmissive teaching, which reflects the view that someone will learn merely by being told, without necessarily needing to make such links. While, in the early stages of the project, PEEL teachers and researchers acknowledged and espoused this view of active student learning, it took some time before we did what is now obvious and applied the same principles to the learning required by the teachers themselves. Fostering conceptual change in teachers occurs not by transmission from others, but by having them firstly change their teaching practices (behaviours) in a limited way, then

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observe, reflect upon and share the results with others. This focusing on systematic change to particulars of personal practice provides a constructivist basis for changes in attitudes and conceptions. In this section, we consider the conceptual advances made in PEEL that formed the basis for teachers' metacognitive development.

Central to the metacognitive development in PEEL is for the teacher to focus on three key questions, "Why am I in this classroom?", "What am I doing?" and "Why am I doing it?". These questions allow progress towards understanding of the more general, and less easily researched question, "What is good teaching?". The pathway that PEEL teachers took in order to progress towards answers to these questions is summarised in Figure 1.

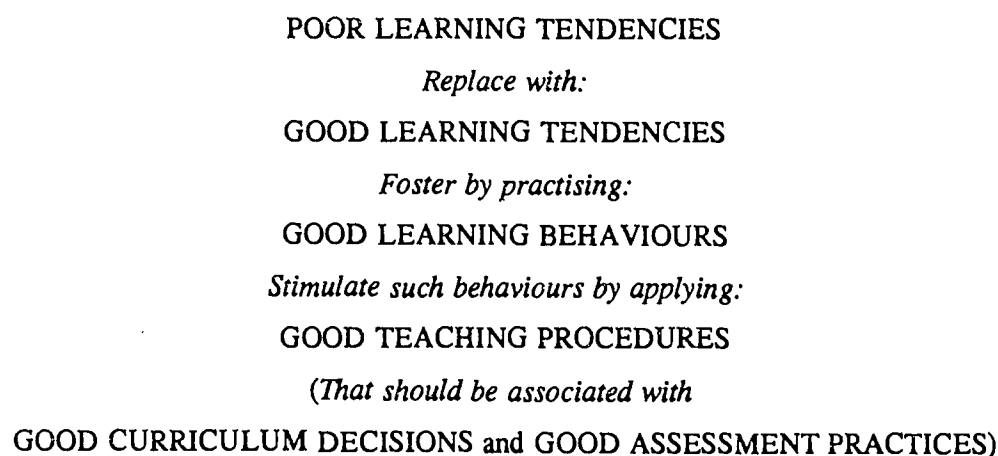


Figure 1: PEEL pathway for improvement of learning.

The essence of Figure 1 is firstly its focus on the nature of good student learning, and then on the nature of good teaching, considered expressly as teaching that will foster such learning. The detail of Figure 1 has been discussed elsewhere (e.g. Baird, in press) but, in summary, PEEL teachers compiled a list of various *Good Learning Behaviours* (GLBs) - particular student learning behaviours that teachers would like students to exhibit more often in their classroom learning. Teachers then moved to devise or adapt a range of specific *Good Teaching Procedures*, each of which would foster one or more of the identified GLBs. Teachers' answers to the three key questions above (and, thereby, to the more general question "What is good teaching?") could thus be framed in terms of the extent to which, through their pedagogical approaches and behaviours, they were stimulating students' GLBs. Generation of these specific *Good Teaching Procedures* has occupied much of the time of the teachers ever many years. One product of their work is Chapter 10 in Baird and Northfield, 1992,

where over sixty different teaching procedures are presented. In this chapter, each of these procedures is clearly purpose-related in terms of particular GLB(s) that are fostered by its use.

In the next section, we review some recommendations that arose from PEEL that concern adopting and sustaining a school-based innovation, and consider the Swedish school project in terms of these recommendations.

THE SWEDISH PLAN PROJECT IN TERMS OF PEEL RECOMMENDATIONS FOR TEACHER-LED, SCHOOL-BASED CHANGE

This section is in two parts. First, the second author (Hägglund) presents a summary of the adoption and early implementation of the PLAN project - a Swedish adaptation of PEEL. Then, the first author (Baird) considers aspects of this account in terms of some recommendations for adopting and sustaining an innovation, based on findings from PEEL (Northfield, 1992).

HÄGGLUND'S ACCOUNT

The PLAN project (PEEL in Swedish)

Background to PLAN - metacognition and the PEEL project

In March, 1988, I visited a Swedish school, situated about 90 km from the school where I am a teacher myself. One of the teachers there showed me a new book about schooling and recommended me to read it. The name of the book was: "Improving the quality of teaching and learning - an Australian case study". This was the first time I met PEEL. Unfortunately I was very busy at that time and therefore the book was hidden in some of my book-heaps "to be read some time". I forgot it.

Three years later I was trying to learn more about science teaching at the Centre of Didactics in Uppsala. Among other books we studied: "Development and Dilemmas in Science Education" [Fensham, 1988]. At this moment I looked for a way to teach science on the base of constructivism and, in "Development...", I found some hints that metacognition could be interesting for me to learn more about. Now I found "Improving the quality of teaching and learning" once again in the reference list. Next year we studied "the PEEL-book" carefully and found it very interesting. The book described what had happened at Laverton College in 1985, but we wondered how the situation was now, i.e. in 1991. I determined to find out and, in July 1992, I entered an aeroplane at Arlanda Airport in Sweden and went to Melbourne.

In Melbourne I met many kind and helpful people. I went to Melbourne University where I got an interesting hour with John Baird. I also interviewed Richard White and Peter Fensham at Monash University. I was guided at Laverton College by Damien Hynes and met some of his

colleagues. Unfortunately I had not the opportunity to see Ian Mitchell; he was in Canada.

The visit in Melbourne made me still more convinced of the strength of PEEL, and in the plane to Stockholm I started thinking about how to introduce PEEL at my school. I was aware of the importance of having good relations with the school-leaders, so in September I invited one of the principals, Tommy Svensson, to my home and introduced him in my plans. He was very interested.

PLAN at Gökstensskolan

The school and the community

I am a teacher in Mathematics and Science at Gökstensskolan, a junior secondary school with about 400 pupils and 50 teachers, situated in the middle of Sweden, 120 km from Stockholm. The premises were built in the 1960s, with certain parts added at the end of the 1970s. The School used to have immigrants mostly from Finland. In 1992 there were also a few immigrants from Lebanon, Vietnam and Turkey. The share of immigrants from outside the Scandinavian countries is expected to increase. During the school-year of 1991/92 the teachers chose learning as a theme for the teachers' seminars. During 1992/93 an evaluation has been added. The in-service teacher training has been given as lectures or as study circles bound to a certain subject.

Early Planning

In September 1992 Tommy and I started preparation for an adaptation of PEEL. We chose a different abbreviation in Swedish. We called it the PLAN-project. PLAN in Swedish means something like "Project for Independent learning". A brief description of some important details from our planning year from September 1992 to June 1993 follows:

- A project plan was worked out from September 1992 to January 1993.
- All teachers at Gökstensskolan were informed and invited to PLAN in February 1993. 23 of them joined the project.
- We established telefax contact in February 1993 with John Baird in Melbourne.
- The PLAN-group of teachers were informed three times, two hours each, from March to June.
- We decided to have a notice-board for communication and information in the staffroom.
- After some discussion we decided to start with two teacher-groups in the weekly meetings. We were hesitating between two and three groups.

Current goals, structure and plans for development of the PLAN project

The goals for the PLAN project are:

1. *In order to make the pupils more independent when learning, the teachers should*
 - *increase pupil's responsibility for learning*
 - *develop pupil's strategies for learning*
2. *As a result the teacher's interest for this will increase and so they will develop more and better teaching methods.*
3. *To make the teachers and the pupils consider more carefully the contents of the education.*
4. *To make Gökstensskolan develop more and better routines for co-operation. The PLAN-project will be carried out as follows:*
 - *The project will go on for at least two years starting at the beginning of the school-year in August 1993. In February 1994 the participating teachers decided whether to continue or not in year 2. It seems that the PLAN-members will increase to 25-30.*
 - *One principal (for the time being Tommy Svensson) and one teacher (for the time being Sven-Olof Hägglund) has been working as leaders of the project during the first year. Next year we will probably be three in the project leading team : the two group leaders, and one principal.*
 - *All teachers at the junior secondary school are invited to participate. Participation is voluntary. It will be possible to join or leave the project after one year. Information about PLAN will be given to the teachers in February 1993.*
 - *The teachers who apply for PLAN will meet regularly 60 minutes every other week in two permanent groups with about 12 members. Each group should be represented by teachers with different subjects.*
 - *In each group there should be one teacher responsible for assembling the group and he/she should also make notes from the assemblies. The group leaders will meet 2-3 times a term.*
 - *Time for the teacher meetings will be taken from the in-service teacher training days and the time for conferences.*
 - *Between the meetings each teacher works in one or several of his/her classes with the goals for the pupil as described earlier.*
 - *During the project frequent efforts for the in-service teacher training should be done, for instance lectures giving the participators support and stimulation.*
 - *As the project is proceeding we look for other similar projects going on in other schools close enough to establish contact with them.*

Financial position

Since we have not yet received any financial support, the project will be entirely paid by our

school. Most of the project-money has been used to:

- a) reduce the lessons for two group leaders (one lesson for each)
- b) circulate literature to the PLAN-teachers. All of them have personally got PEEL-book number 1
- c) provide in-service teacher training/educational visits

A report on the project after the first year will probably be financially supported from outside.

Evaluation of the project

The project will be evaluated in two ways - continually through the project, and at two particular times.

1. Continuing evaluation

- a) Each member writes a diary where he/she documents his/her own ideas and questions, thoughts, reflections from the meetings and the intervening lessons.
- b) Each group leader makes notes at the weekly meetings.

2. Summary will be made at two times - in August 1994 and in August 1995. The principal is responsible for this.

Intentions regarding the future of PLAN

Up to now we have not published anything about PLAN in Sweden with the exception of a few short articles in some papers and journals. We intend to have a report of the first year finished in September 1994.

What is the difference?

What is the difference between PEEL/PLAN and many of the other development projects which have been tried out in the school system during the last decades? It is of course not possible to point out one single factor. It is the totality, the sum of all measures that will determine whether the result will be good or bad. Some important factors for these projects are:

- The teachers are committed
It is voluntary to participate
- There is much time for the project
The teachers will meet every week for at least two years
- Support from the school administration
- The teachers and students are owners of the project
The planning has been approved by the PLAN-teachers. After the project has started the teachers reflect on their own classroom practice and search for the meaning behind the

decisions they make and the behaviours they exhibit

- *The purpose is more than just training some activities. It is long-term training for enhanced metacognitive awareness and control.*

In the future these kind of projects therefore can be important and interesting ways of changing the school practice. The PLAN-teachers at Gökstensskolan in Sweden are interested to hear more news from the PEEL groups in Australia.

BAIRD'S COMMENTS IN TERMS OF PEEL RECOMMENDATIONS

Northfield (1992) draws on PEEL findings to propose a series of nine "specific recommendations" (p.277) as a guide for implementing change. I shall centre the following discussion on two of these recommendations, and indicate how the obvious success of PLAN, as evidenced from Sven-Olof's description above, has been primarily influenced by these two recommendations, supplemented, through good planning, by appropriate implementation of many of the others.

The two key recommendations from PEEL are Recommendations 1 and 2. These recommendations relate to successful adoption and embedding within the school's structures and operations. Crucial to this adoption and embedding, however, is the presence within the school of an "idea champion", as discussed below.

Recommendation 1: Get senior school staff (Principal, Deputy Principal, Curriculum Coordinator, Professional Development (PD) officer) on-side by making PEEL relevant to the school's needs and concerns.

The cooperation and collaboration of Tommy Svensson, Principal of the School was sought and obtained from the beginning of the project. Teachers at the school had already agreed on a focus on active learning for current PD and Curriculum initiatives. There is evidence (further to that given in the account above) that the educational climate in Sweden is conducive to initiatives aimed at active, purposeful classroom learning.

Recommendation 2: Train group leaders in the cognitive and affective demands of the position; provide them with on-going guidance and support.

From the outset of the PLAN project, it is clear that Sven-Olof is, in Daft and Becker's (1978) terms,

an "idea champion". He is a perceptive and irrepressible change agent who stimulates and motivates others by his dedication and drive. Above all other factors, he has been, and remains, the primary determiner of success. Obviously, the project would not have commenced without him (and his commitment to take such decisions as that to fly to the other side of the world to gain knowledge on which to ground PLAN). While many school-based coordinators of PEEL groups in Victorian schools have similar idea champion qualities, they have at least had some on-going guidance and support arising from local University academics and PEEL teacher group networks. For Sven-Olof, however, opportunities for guidance and support were limited to reference to the PEEL books and a regular PEEL newsletter (entitled PEEL SEEDS), an occasional fax from Melbourne and, until now, what has been one visit by myself to his school (in 1993). Many years before, in the first few years of PEEL at Laverton Secondary College, Ian Mitchell assumed the role of a key idea champion without much conceptual or infrastructure support, with similarly positive results.

For three of the remaining seven recommendations, it is apparent from Sven-Olof's account above that the planning that has been done to establish and sustain PEEL at Gökstensskolan is providing for their key elements. These recommendations are:

Recommendation 3: Have regular meetings and, in these meetings, have regular times to reflect, establish direction, and generate understandings of the nature and purpose of what is done.

Recommendation 4: At meetings, cater explicitly for the needs and concerns of all participants (who may differ widely in experience and expertise).

Recommendation 6: Ensure that written material is circulated.

The implementation of one other recommendation (*Recommendation 5: Have regular outside input to meetings, and make links to school networks such as the PEEL Collective*) is severely limited at the moment by PLAN's isolation, but Sven-Olof is currently establishing a network of PLAN schools in his area, and also making links with the University of Uppsala to have at least one academic make regular visits to the school in order to provide an outside perspective and support.

The account above does not provide clear evidence for compliance with the final three recommendations given below, but my contact with Sven-Olof and my visit to the school assures me that they are being given appropriate attention. These recommendations are:

Recommendation 7: Encourage informal guidance and support (a "buddy system").

Recommendation 8: Ground an individual's effort firmly in classroom practice.

Recommendation 9: Develop motivation and commitment: acknowledge past efforts; stimulate future efforts through the setting of fresh challenges.

CONCLUSION - THE IMPORTANCE OF TEACHER-LED CHANGE FOR EDUCATIONAL IMPROVEMENT

The PLAN project is in its infancy, but it already provides some intriguing evidence for the generalisability of rationale, approach and outcomes of a type of school-based educational change. Although set within a quite different societal and school culture to those of PEEL, the progress and outcomes of PLAN reinforce those of PEEL in indicating the efficacy of purposeful teacher-led Collaborative Action Research for school and system-wide educational improvement.

Common to the aspects of the discussion above is the need for an individual (or group of individuals) to provide leadership, motivation and encouragement for other teachers to enter into what is a difficult and demanding process of change. For substantive and durable change to occur in individuals or groups, certain factors are necessary. These factors concern adequate *time* for change (a plan that encompasses months or years), and collaboration (usually through group meetings) that will allow for adequate *opportunities, guidance and support* for the change process.

While not discussed above, there has also been another, independent, adaptation of PEEL-type ideas by a number of teachers in Denmark. Two of these teachers, especially, had already been trialing ideas similar to those of PEEL, but found a basis for corroboration and extension of their efforts in the Australian project. They have since been very active in publicising PEEL throughout Denmark (even to the extent that one of them, Jens Dolin, coined the term "PEEL-grims" for the nature of their work!). The results of this second Scandinavian adaptation have significant implications for Danish school- and system-level educational policies and practices. Aspects of the Danish experience are reported elsewhere (Baird, Hägglund, Ingerslev and Dolin, 1994). As with the Swedish example, the results attest to the potential for substantive and desirable educational change that rests with enthusiastic, committed school teachers.

REFERENCES

- Baird, J.R., (1992). The nature of PEEL. In J.R. Baird and J.R. Northfield (Eds.), Learning from the PEEL Experience, Melbourne, Monash University Printery Services.
- Baird, J.R. (in press). A view of quality teaching. In K. Tobin and B. Fraser (Eds.), International Handbook in Science Education. The Netherlands: Kluwer Publishing.
- Baird, J.R. and J.R. Northfield (Eds) (1992). Learning from the PEEL Experience, Melbourne: Monash University Printery Services.
- Baird, J.R., and Mitchell, I.J. (Eds) (1986). Improving the quality of teaching and learning: An Australian case study - the PEEL project, Melbourne: Monash University Printery Services.
- Baird, J.R., Hägglund, S., Ingerslev, G., and Dolin, J. (1994). Some international, teacher-led initiatives for active science learning. Paper presented at the annual conference of the Australasian Science Education Research Association, Hobart, July.
- Connors, B., (1991). Teacher development and the teacher. In P. Hughes (Ed.), Teachers' professional development. Melbourne, Victoria: Australian Council for Educational Research.
- Daft, R., and Becker, S. (1978). The innovative organisation. New York: Elsevier.
- Department of Employment, Education and Training; Inservice Teacher Education Project. (1988). Teachers Learning: Improving Australian schools through Inservice teacher training and development. Canberra: A.G.P.S.
- Fensham, P.J. (Ed.), (1988). Development and Dilemmas in Science Education. Lewes, Sussex: Falmer Press.
- Northfield, J.R., (1992). Principles for adopting and sustaining an innovation. In J.R. Baird and J.R. Northfield (Eds.), Learning from the PEEL Experience, Melbourne: Monash University Printery Services.
- Sikes, P.J., (1992). Imposed change and the experienced teacher. In M. Fullan and A. Hargreaves (Eds.), Teacher development and educational change. Lewes: Falmer Press.