

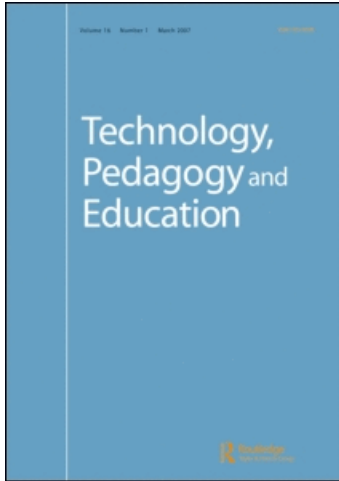
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### **A framework for reviewing teacher professional development programmes in information technology**

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## **A Framework for Reviewing Teacher Professional Development Programmes in Information Technology**

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**ABSTRACT** There are very few credible frameworks for evaluation of teacher education programmes. The authors advocate the application of a paradigm originally designed for educational software assessment as a framework for reviewing teacher professional development. The framework is based on a situated view of cognition and this ensures an authentic approach. Five commonly observed foci for teacher professional development are considered in terms of the paradigm, leading to consideration of the comprehensiveness of professional development programmes. The analysis is illustrated by discussion of the professional development programme in place in a school. The analysis strongly suggests that a school-focused approach is appropriate for teacher professional development in the information technology area.

### **Introduction**

Information technology (IT)-related change in education is a complex and challenging task. Evaluation in this area is difficult; many of the traditional evaluation models are simplistic and inadequate, even misleading in this context, failing to capture the richness of the problems associated with the introduction, integration and institutionalisation of IT in education (Marshall & Somekh, 1997). The development of teacher education programmes in this context has similar problems, including a need for suitable models and theoretical frameworks to assist planning and assessment.

In this paper we suggest that a paradigm originally developed for evaluation of other IT-related educational activities can offer assistance in the structuring of evaluative thinking about the content of I-related teacher professional development programmes. The framework is the Perspectives Interactions Paradigm (Squires & McDougall, 1994). A distinguishing feature of the paradigm is its adoption of the situated nature of learning

(Squires & McDougall, 1996). In the light of the importance of authenticity in teacher professional development courses, this paradigm might provide a useful framework for evaluative thinking in the teacher professional development context. The paradigm has already been successfully used in a formal teacher education course (McDougall & Squires, 1995), and Squires (1997) has argued for a wider application of the paradigm in an IT teacher professional development context.

We begin the discussion by considering a set of five commonly observed foci for teacher professional development activities in the IT area. Then we locate each of these foci in a framework provided by the Perspectives Interactions Paradigm. This reveals the likelihood of a lack of comprehensive coverage of important issues in professional development programmes dominated by a subset of the foci listed. To illustrate the application of the framework, we use it to examine the professional development programme in place at a school which is currently the subject of a longitudinal case study by one of the authors. Our closing discussion contends that the use of the paradigm can contribute to the structuring of evaluative thinking in this area. Several models of teacher professional development are considered. On the basis of criteria of authenticity and comprehensiveness, our preference for school focused programmes of teacher professional development for IT in education is argued.

### **Foci for Professional Development Activity**

In this section of the paper we look at a range of five commonly observed foci for teacher professional development activities in the IT area. We shall outline typical methods by which teachers obtain professional development experiences with each of these foci.

#### *Focus 1: skills in using particular software applications*

The simplest and most common professional development activities undertaken in the IT area are those aiming to develop in teachers' skills in using specific software packages or applications, such as word processors, an operating system, or Internet access software. Activities with this type of focus might be short courses, offered by software vendors, teacher associations or professional development centres, adult education centres, or as part of a school's community education initiative. They might take the form of hands-on workshops at a formal professional development session in the teacher's school or at a conference elsewhere. They might be less formal, e.g. an individual teacher seeking help from another, or taking home the software manual for an evening of private study and exploration of the software package.

*Focus 2: integration of IT into existing curricula*

Perhaps somewhat less common than the previous type are professional development activities focusing on the integration of the use of technology into the curriculum with which a teacher is working. These activities might again appear as discussions and materials preparation activities in formally presented teacher professional development courses. They might occur informally as a teacher examines printed or other support materials accompanying a software package .

*Focus 3: IT-related changes in curricula*

The use of IT in educational contexts has opened up many possibilities for curriculum change; often these reflect IT-related changes in the nature of disciplines. For example, simulations and data logging in Science have provided opportunities to change the nature of experimental work in schools. Similar statements can be made, for example, for graphing and Statistics packages in Mathematics, for the use of computer-controlled keyboards and related equipment in Music, and so on. For such changes to reach classroom implementation, it is necessary for teacher professional development activities to be undertaken with a focus on IT-related changes in curriculum. Like the previous group, these might take more or less formal forms, such as discussions and workshops in formal professional development sessions, or less formal help-seeking, learning and practice by individual teachers.

*Focus 4: changes in teacher roles*

The use of IT in classrooms can be associated with significant changes in classroom climate, and teacher and student roles in learning. For example, increases in student autonomy and responsibility for learning have been reported frequently. Group work and collaborative learning activities can be enhanced when IT is used, and observation of students working with computers can be used to better understand learning processes and to develop strategies for catering to individual student differences in intellectual style and approaches to learning. Teachers need professional development experiences focused on changed techniques for classroom management and strategies for exploiting the potential of IT to enhance classroom learning processes. Again, this might be done in formally organised discussion and experience-sharing professional development sessions, though it is probably more commonly a result of informal staffroom conversations and individual teachers' personal ongoing reflection about their classroom activities.

*Focus 5: underpinning theories of education*

The use of IT in education provides a rich environment for critical thinking about fundamental educational concerns, such as how learning occurs, individual differences in learning processes, issues in curriculum development and organisation, and many aspects of the theoretical underpinnings of what occurs in classrooms and other learning environments. Because of the depth and complexity of many of the issues here, professional development activities concerned with this type of focus may need to be more sustained than, for example, the short courses often used for activities with foci listed earlier. They can require a considerable amount of reading, discussion and reflection by the participants, and are often guided by an expert in the area. Opportunities for such sustained examination and reflection on the underpinning principles in education are most typically provided for teachers through enrolment in formal courses at places other than the school, typically at post-graduate levels in tertiary institutions.

### **The Perspectives Interactions Paradigm and Teacher Professional Development**

We have developed the Perspectives Interactions Paradigm as a way of providing a framework for software evaluation (Squires & McDougall, 1994; McDougall et al, 1996). However, this paradigm can provide a more general framework for thinking about the use of IT in educational settings; in particular, it can be used to provide an organising framework for thinking about teacher professional development and for structuring evaluative thinking in this area of IT use.

The paradigm is based on the mutual 'interactions' between the principal 'actors' involved in the classroom use of IT. Three actors contribute to the learning situation when IT is used: two live actors (the teacher and the student) and one passive actor (the software designer). By considering the interactions between the perspectives of pairs of these actors, e.g. the interaction between the perspectives of the teacher and the designer, the situation the package is used in can be visualised (Squires & McDougall, 1996), leading to the generation of a comprehensive set of contextually sensitive issues concerned with the use of IT.

Consideration of the interaction between the perspectives of the designer and the teacher raises issues related to explicit, implicit, or even absent, curriculum considerations in the use of IT. Explicit curriculum issues are evident when specific IT-related activities to support a defined syllabus are envisaged (e.g. Flavell et al, 1993). When explicit links to a syllabus are made, activities will naturally be seen as 'slotting into' the existing curriculum rather than as providing opportunities for effecting curriculum

change. More general links to a topic area may involve implicit curriculum issues, making the identification of IT-related activities more problematic. However, the more open-ended links open up the possibility of more innovative use, with IT activities devised to effect changes in the curriculum. Absence of curriculum issues arises when software not originally intended for use in education, e.g. wordprocessors, is used. There is scope here for innovative and imaginative IT-related activities to be devised. In terms of professional development, it is relatively straightforward to include a consideration of explicit curriculum issues, but the treatment of IT skills related to implicit or absent curriculum emphases requires a more considered approach. Professional development activities with the first three foci outlined above can be thought about in terms of this perspectives interaction. Professional development activities with our fifth focus can also be thought of in this way.

The teacher–student perspectives interaction explicitly raises issues related to the learning situation. A consideration of changes in the distribution of responsibility for teaching and learning between the teacher and student(s) is implied. In this context classroom teachers can be regarded as managers and supporters, as opposed to directors, of student-focused activities. Collaboration between peers, particularly in small groups, often becomes very important when IT is used (Hoyles et al, 1994), particularly in terms of enhanced peer discussion (Chatterton, 1985). Such changes in classroom environments clearly have implications for teacher professional development, and professional development activities focused on changes in teacher roles, the fourth focus listed above, can be linked to this perspectives interaction.

The interaction between the designer's and student's perspectives enables the raising of issues relating to ways in which the use of IT-related activities can aid learning. This perspectives interaction is essentially concerned with the theory of learning that underpins the use of an IT application, and implies a knowledge and understanding of theories of cognition. Furthermore, it implies an understanding of how 'classic' styles of IT use, e.g. simulation, relate to different views of how learning occurs. The situated nature of the paradigm implies a constructivist view of learning. Authenticity and stimulus or concept complexity are crucial in constructivist learning environments (Honebein et al, 1993). Honebein et al identify three conditions for authenticity: a sense of ownership of learning, engagement in global activities which go beyond mastery of local skills, and use of multiple perspectives in problem solving. Professional development activities focused on issues related to this perspectives interaction would be included in those with the fifth of our foci.

In Table I we have summarised the foci of professional development activity described above in terms of the Perspectives Interactions Paradigm.

The foci outlined are listed in decreasing level of provision, i.e. Focus 1 is the most frequently offered type, and generally the most popular.

Professional development focus	Perspectives interaction		
	Teacher– designer	Teacher– student	Student– designer
1 Skills with particular applications			
2 Integration into existing curricula			
3 IT-related changes in curricula			
4 Changes in teacher role			
5 Underpinning theories of education			

Table I. Foci for professional development activities related to perspectives interactions.

It is not uncommon for professional development programmes to be conceived almost entirely in terms of Focus 1. Clearly, this provides professional development of very limited scope; only considering issues arising in the teacher-designer perspectives interaction and ignoring those associated with the other two interactions. Adding to such a programme activities having the second or third focus enhances the authenticity of the professional development programme, but the scope remains limited as only issues in the teacher-designer perspectives interaction are considered. It is not until activities related to Focus 4 are incorporated in the programme that the scope is broadened. Most importantly, a consideration of Focus 4 critically increases the authenticity of the programme. While a consideration of the first four foci provides an authentic programme, it is not until the inclusion of the fifth focus that a truly comprehensive programme can result.

**Examining a Specific Professional Development Programme with this Approach**

We shall consider the professional development programme in place at a specific school, John Paul College in Brisbane, Australia. After outlining the characteristic features of the programme we shall examine it in terms of the Perspectives Interactions Paradigm, as outlined above. A fuller description of the programme at the time of writing can be found elsewhere (McDougall & Betts, 1997). Clearly, in an innovative environment professional development will evolve building on past experience, and by the time this article is published there may well be changes to the professional development programme as we describe it below.

John Paul College, a large independent co-educational combined primary and secondary school, has had an extensive curriculum technology programme under development since the early 1990s. It is College policy to

integrate technology use with all appropriate aspects of the curriculum throughout all year levels of the school. This, of course, has had major implications for teacher professional development. The following outlines professional development strategies used by this school:

- x **Formal professional development activities:** a steering committee is responsible for directing and managing new technologies across the curriculum, including the identification of core skills that need to be introduced to staff systematically, in the context of the discipline areas where possible. This group administers a significant proportion of the technology-related material in the College's formal school-based professional development sessions. Two key areas of teacher needs have been identified: the development of technical skills with specific software packages, and the application of computing to achieve educational outcomes. A typical evening programme might open with a keynote address, followed by a range of workshops from which individual teachers select, dinner, a "sharing session" for viewing successful computing applications from various areas of the school, and a final workshop session.
- x **Computing co-ordinators:** key teachers with qualifications and experience in educational computing are allocated to various year levels throughout the school. These teachers do not have regular teaching duties; their tasks include curriculum planning and development of curriculum materials with the classroom teachers, working with individual teachers on curriculum IT problems and innovations, and regular classroom visits to support the introduction of new ideas and activities by the classroom teachers. Individual teachers seek the co-ordinators' advice and assistance with development of their personal computing skills as well as on curriculum-related issues.
- x **Community Education:** during the evenings and weekends a community education centre run by the school provides a range of courses which cater for the needs of the community, and many of these courses concern computing applications. These courses are free of charge to all staff members at the school, and teachers are encouraged to attend.
- x **Library/resource centre involvement:** staff members in the library/resource centre at the school are closely involved with the ongoing professional development programme. Teachers can seek curriculum resource information from here; help might include information about, and strategies for, finding and assessing useful Internet sites and CD-ROM software to supplement print and other information resources, as teachers plan and develop units of work for students.
- x **Technical support:** a technical support and development centre within the school also performs a teacher professional development role. Probably the most used facility provided by this group is the 'Help Desk'. Often



problems with the technology can be solved by telephone consultation, but the group also provides personal assistance and individual tutorial help for teachers with technical problems.

Professional development focus	Perspectives interaction		
	Teacher–designer	Teacher–student	Student–designer
1 Skills with particular applications	Pformal professional development sessions Pcommunity education Pcomputing co-ordinators P-independent work Ptechnical support		
2 Integration into existing curricula	Pformal professional development sessions Pcomputing co-ordinators Plibrary/resource centre help		
3 IT-related changes in curricula	Pformal professional development sessions Pcomputing co-ordinators		
4 Changes in teacher role		Pformal professional development sessions Pinformal discussions among teachers Pcomputing co-ordinators Pteachers' personal reflections	
5 Underpinning theories of education	Pkeynote speakers in formal professional development Pindividual reading and reflection Penrolment in tertiary classes		Pkeynote speakers in formal professional development Pindividual reading and reflection Penrolment in tertiary classes

Table II. Analysis of the teacher professional development programme at John Paul College.

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We shall structure our examination of the programme using the professional development foci discussed in the previous sections. The results of this analysis are summarised in Table II.

Focus 1: Skills in using particular software applications are gained through hands-on workshops included in the formal professional development sessions, attendance at community education courses, consultations with the computing co-ordinators, independent work with the software, and occasional assistance from the school's technical support team.

Foci 2 & 3: Integration of technology into existing curricula and the introduction of IT-related changes in curricula are supported again to some extent through the formal professional development sessions. The computing co-ordinators play a particularly important role here, extending the work done in formal sessions, working with teachers in collaborative planning of curriculum topics and activities, supporting, sometimes with team teaching, their use of new equipment or implementation of innovative ideas. The work of the staff in the library/resource centre is also particularly relevant here.

Focus 4: Changes in teacher roles can be discussed in the formal professional development presentations, most probably in the 'sharing' sessions. More important for experiences with this focus are informal discussions among teachers, and between them and the computing co-ordinators, as well as teachers' own personal reflective activities.

Focus 5: Underpinning theories of learning and philosophies of education can be the focus of keynote speakers' presentations at the formal professional development sessions. Otherwise the major source in this school for professional development of this kind is the individual reading and reflection of many of the staff, guided in some cases by university lecturers as part of the teachers' enrolment in tertiary courses such as post-graduate diplomas or coursework masters degrees in educational computing.

The IT professional development programme at this school involves on-site resourcing for professional development activities, concurrent and integrated with classroom teaching. Clearly, this promotes authentic professional development activities. Furthermore, an analysis of the programme using the Perspectives Interactions Paradigm indicates that it is comprehensive, with professional development activities addressing issues raised within all three of the perspectives interactions.

### **Discussion**

Our analysis indicates that the Perspectives Interactions Paradigm can be used to provide a framework for thinking about the content of teacher IT professional development programmes. The situated nature of the paradigm

provided an initial rationale for its application to address issues in IT teacher professional development programmes, which are highly context-sensitive. When the paradigm is used in this way, it is evident that the resulting analysis provides an insight into the extent to which the content of professional development programmes are comprehensive.

An indication of the extent to which a programme is comprehensive is given by the depth to which issues arising in each of the perspectives interactions are included. Omission of consideration of issues arising in one or two of the interactions indicates a very limited scope.

For example, many professional development programmes only adopt activities with the first three foci, leading to the identification of issues related only to the teacher-designer perspectives interaction. When the fourth and fifth foci are adopted, issues arising in the teacher-student and student-designer perspectives interactions become evident. In addition, considering the teacher-student perspectives interaction is crucial to developing an authentic professional development programme.

Our analysis shows that an IT teacher professional development programme which is both comprehensive and authentic involves a wide range of activities. Some of these activities are school based, being initiated, planned, and executed by school staff for teachers actually serving in the school (Millar, 1990). Examples include private study, individual work with advisory staff, informal peer discussion, and personal reflection. The inherent advantage of a school-based approach is that activities can be provided that are clearly relevant to the needs of staff within a school (Henderson, 1979; Morant, 1981). Other activities are based on contributions which are external to the school. Examples include external consultancies and attendance at conferences and professional development courses. Attendance on courses is described by Morant (1981) as a 'top-up' approach in which teachers can be educated by correcting deficits in their knowledge. Examples of courses are short formal courses, invited 'expert' presentations and participation in academic courses, including award bearing degree and diploma programmes.

The eclectic mixture of school-based and externally provided activities implied by the perspectives interactions analysis is consistent with a school-focused approach to professional development; the priority of which Millar (1990) cites Howey (1986) as describing as "the improvement of those conditions and processes which most directly affect the quality of education of students within a given school" (p. 24). A school-focused approach attempts to realise the advantages of the school-based approach and minimise the disadvantages of a purely course-based approach. The school-focused approach typically involves contributions from staff within the school and external consultants, as well as course attendance.

The positive link between comprehensive and authentic professional development and a school-focused approach is illustrated by the description

of the professional development programme offered at John Paul College. An inspection of Table II shows that issues arising in all three of the perspectives interactions are addressed, and that the professional development activities include a wide range of both school-based and external activities.

An application of the Perspectives Interactions Paradigm to an analysis of IT teacher professional development programmes shows that such programmes should be school-focused. Such an approach encourages the provision of a range of activities which will promote an approach to IT teacher professional development that is both authentic and comprehensive.

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