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Catalytic Tools: understanding the interaction of enquiry and feedback in teachers' learning

Abstract

This paper investigates how the use of Pupil Views Templates (PVTs), a tool designed to elicit, record and analyse the development of students' awareness of their own learning processes, supports teachers' professional learning. This paper reports on a three-year collaborative practitioner enquiry project involving more than 30 primary and secondary schools in England. The data set includes practitioners' case studies, interviews, questionnaires and cross-project analysis completed by the University team. Analysis focuses on the role of feedback, stimulated through the use of PVTs, in teachers' learning through three dimensions: the influence of student feedback on teachers as part of the pedagogical encounter; the influence of student feedback on schools within the context of the practitioner enquiry projects; the influence of feedback on the lead teacher researchers Links between the tools used, the source of the feedback, and teachers' learning are mapped from a 'second order perspective' derived from the diverse data sources.

Introduction

Learning through Enquiry

In this paper we investigate the role of feedback resulting from the use of a tool designed to elicit, record and analyse the development of students' awareness of their own learning processes within a national project aimed at promoting 'learning to learn' in schools (Learning to Learn Phase 3). We locate our work within the literature on feedback in professional learning (Reed and Stoll, 2000; Hargreaves, 2000; Watkins, 2000) which emphasises how teachers themselves can learn from student feedback in the process of bringing about change in classrooms and schools. Our understanding of teachers' experience of learning through enquiry and collaborative networks builds on work with teachers on developing a 'metacognitively rich' pedagogy (McGuinness 2007) to support students' learning abilities (Author, 2002; Author, et al, 2006).

As we have found in previous projects, there is evidence of the 'mirror effect' (Wikeley, 2000) on teachers engaged in metacognitive pedagogy whereby interventions

designed to have a particular impact on student learning have a similar effect on teachers. As teachers focus on encouraging their students to adopt an open-ended, enquiry stance to learning in which they are encouraged to be speculative, to value their own experience and to learn from each other then they begin to do the same themselves. Consequently, a shift from performance orientation to learning orientation (Dweck, 1986) in pupils impacts on teachers. Teachers also begin to manifest greater persistence, flexibility and the capacity to work more effectively in solving difficult problems in their own pedagogical practice.

Engaging with this rich and complex data concerning cycles of feedback within the Learning to Learn (L2L) project begins to weave together,

> …ideas of teacher learning, professional development, teacher knowledge and student learning – fields that have largely operated independently of one another. (Wilson and Berne, 1999; p.204)

We argue that it is by participating in the practice of enquiry (Greeno and Goldman 1998) to support student learning that teachers gain access to feedback that stimulates their own professional learning and enables them to become reflective practitioners (Schon 1983). The evidence from the L2L project adds to what is already known, from collaborative projects on learning in Mathematics (Fennema, Carpenter et al. 1996; Greeno and Goldman 1998) for example, by giving particular attention to the role of tools for enquiry.

Catalytic Tools

> "A tool is also a mode of language, for it says something to those that understand it, about the operations of use and their consequences… in the present cultural setting, these objects are so intimately bound up with intentions, occupations and purposes that they have an eloquent voice"
>
> (Dewey, 1938)

The significance of tools for enquiry for the development of metacognitive pedagogy is supported by systematic reviews of research into the impact of thinking skills approaches on teachers and students (author). Tools, as technologies have been designed to make a particular activity different: faster, slower, richer, more focused, more efficient, more

sustained. Tools change or re-shape the semiotic frame for an activity (Bosch & Chevallard, 1999; Author and Author 2006), carrying with them the rules for how they are used. In this sense, one can argue that tools are part of the implicit learning of a professional culture, since they frame practice and thus practice develops as new tools and technologies facilitate or enforce change (Hickman, 1990).

When using a new tool in the context of pedagogical practice, the teacher has the opportunity to engage in a re-framed experience. The experience will have aspects of familiarity – since the tool is grounded in the territory of learning – and of novelty – since something is being added to the repertoire. This combination of security and novelty creates the conditions for the teacher to experience 'positive dissonance' (author) whereby routines and expectations are disrupted without the teacher feeling vulnerable and new channels for feedback are opened up. This is the tool's catalytic quality: it can change the composition of other agents in the environment or organisation whilst maintaining stability by not being changed itself. Although pedagogical tools can be characterised as determining the frame within which the teacher works, the individual agency of the teacher comes from deciding which aspects of the feedback from their use to prioritise and whether and how to act on this information. Indeed, our experience in the L2L project suggests to us that, for some teacher researchers, tools can generate the kinds of dissonance and questioning, the multi-layered, ever-expanding exploration of meaning in a particular learning interaction which lead to a transcendence of 'tool as artefact'. In these cases, the tool becomes an epistemic object (Knorr Cetina, 2001), enticing the researcher into further enquiry.

The Learning to Learn Project

The L2L Project has been running for eight years and is now in its fourth phase. It is funded by the Campaign for Learning, a UK charity committed to promoting learning in the family, the workplace and in schools. The first two phases (2000-2002) involved small-scale

action research projects in schools selected through a national competition and did not have a formal link to Higher Education researchers. In Phase 3 (2002-2007) three Local Authorities (LAs) in England were invited to join the project, at the same time a team of university researchers were commissioned to provide support and evaluate the impact of the project on students and teachers as learners. Phase 4 (2008 -2011) is looking at the issues of scaling-up as the project spreads to more schools and also has a link to Colleges of Further Education.

Within the L2L project there is an overarching definition of 'learning to learn' articulated by the Campaign for Learning:

> "…a process of discovery about learning. It involves a set of principles and skills which, if understood and used, help learners learn more effectively and so become learners for life. At its heart is the belief that learning is learnable."

http://www.campaign-for-learning.org.uk/cfl/learninginschools/l2l/index.asp (accessed 14.11.08)

Teachers in the project were introduced to a set of desirable learning dispositions (readiness, resourcefulness, resilience, remembering and reflectiveness) developed in Phases 1 and 2 of L2L and known as the '5Rs' (Rodd, 2002, 2003). They were required to work in pairs or small teams to undertake a classroom based investigation into an aspect of 'learning to learn', in terms of one or more of the 5Rs, as appropriate to their own context. The 30 schools in three geographical areas (London, the South West and North West of England) represented a wide range of individual contexts. The project includes large secondary schools and small infant schools, rural, urban and suburban schools, schools with affluent, stable populations and schools with multiply disadvantaged, transient populations. Each geographical cluster was additionally supported by a co-ordinator from the Local Authority or Education Action Zone in which the regional project was based who organised additional local meetings and networking.

In each year of the three year project the teachers involved had the opportunity to attend two regional development days in the Autumn and Summer terms and a two-day national residential conference in January. The conferences featured key note sessions from

leading figures in a topical area of research into learning in schools, such as assessment for learning. As the project progressed, the teachers' individual case studies were shared with all of the participating schools. The detail of the work undertaken by schools can be seen in the annual case studies completed by the teachers for inclusion in the end of year reports (reference withheld). The annual reports also provided an overview of the findings from the cross-project analysis conducted by the university based team

Data collected during Phase 3 of the project includes 85 annual teacher case studies completed over the 3 years; 67 semi-structured teacher interviews collected over three years; annual cross-project analysis; a three-year overview conducted by the University partner and a teacher questionnaire completed towards the end of the last year of the project. In addition, informal channels of communication (email and personal contacts with teachers), whilst their limitations as a reliable source of evidence are acknowledged, have been included in the process of interpretation. Within L2L, teachers use a variety of pedagogical strategies to focus on different aspects of the 5Rs but there is a common interest in making the *processes and intentions* of work in the classroom explicit. The overarching focus on learning processes and metacognition (Moseley, *et al*, 2005; Veenman, *et al*, 1997) has meant that, in spite of the diversity of individual inquiries, some unifying themes have emerged across the project and one of the most powerful of these has been the role of feedback (Hattie, 2005).

The Pupil View Templates (PVT) was one of the tools used in the project developed by the university team to elicit and record students' awareness of their own learning. Ten schools within the Learning to Learn project used PVTs and wrote about their impact in the classroom in their annual case studies reporting the impact of each investigative cycle on student learning and teachers' own professional development. The schools were all infant and primary schools serving children from the ages of 3-11 years old. They can be divided into three groups by their size and the population they serve: small and medium-sized rural

and suburban schools and larger inner city schools (Table 1). The levels of Special Educational Need and of children with entitlement to Free School Meals does not vary significantly between the groups. However, in inner-city schools the children were much more likely to have English as an Additional Language.

Insert Table 1 here

The case studies completed by teachers using PVTs were analysed to determine how they had been used in their school and the benefits identified by the teachers. Whilst this means that the accounts were self-reported, the template for the case studies emphasised the need to provide supporting evidence and to be transparent in the reporting of the cycle of enquiry they represented. In addition we were able to contextualise the case study within the cross project data, such as teacher interviews and field notes, collected by the university based team. Preliminary findings were shared with participants in the project through the regular regional development days and the annual conference for critique and validation.

Student Feedback

Pupil Views Templates as a catalytic tool

The Pupil View Template (PVT) is an example of the metacognitive tools we have developed to enable feedback to be used productively both in the here-and-now of the classroom interaction and reflectively within the enquiry cycle. PVTs are a predominantly visual method (Prosser, 2007) and were inspired by work completed by the Bubble Dialogue team, McMahon and O'Neill (1992) and Jones and Price (2001) for example, and also the research of Hanke (2001). Data is collected around an image of the learning situation being investigated in a three-way interaction between the teacher-researcher, the pupils and the template. The key idea is that pupils can be asked, using a cartoon representation, to reflect on their thinking regarding different aspects of their experience. The speech bubble and the thought bubble on the template means that there is an automatic prompt for the pupil to

talk about what they are thinking. This could very simply be what they think about a specific activity, for example independent reading, or it could be more sophisticated with regard to the more abstract thinking processes which they associate with or utilise during a specific activity. The latter abstraction into metacognitive process can be seen to link with Veenman and Spaans' (2005) concepts of metacognitive awareness and metacognitive skilfulness.

Insert Fig 1 here

Teacher testimony from previous projects suggests that the use of such tools has stimulated their understanding of their own professional learning (author). The classroom interactions engendered and supported by the use of tools not only make learning more explicit and accessible to the learner but also enable teachers to move beyond surface detail as the process of teaching is opened up to critical enquiry. The experiences of the teachers involved in the L2L project endorse this view and indicate how L2L offers a focus for developing pedagogy that stimulates and supports practitioner enquiry. Here, we provide an illustrative example of the relationship between tools, feedback and enquiry based on the analysis of the use of PVTs.

Student Feedback Influencing the Teacher

Teachers used PVTs in a variety of ways within the L2L project. The template was modified to represent different learning contexts such as paired-work or group work and the use of different resources. Some teachers experimented with using photographs rather than cartoons but this was discontinued when it was found to distract students from focusing on their thinking about the learning processes depicted. Analysis of the case studies and interviews with teachers using PVTs reveal some common themes. The teachers report changes in the patterns of interaction and dialogue when PVTs are in use with students being able to talk about the processes of their own learning and being willing to listen more carefully to the opinions of their peers. The disruption of the traditional,

dominant I-R-E pattern (teacher **I**nitiation, student **R**esponse and teacher **E**valuation) in classrooms reported by the teachers is consistent with findings from other studies focusing on metacognitively rich pedagogies (Davies, 1995; author; McGuiness, 2007). Over time, as they became embedded in classroom practice, the PVTs also acted as a vehicle for improved relationships and less negative competitive behaviour:

> "They all want to achieve and they want to help each other to achieve. There's no sense of 'if I help him he might get better than me', but they go up to the teacher, [saying] 'he has got better at this hasn't he?'"
>
> (School J, 2nd year interview)

The teachers acknowledge their surprise at the extent to which the students are able to support each other (an example of the positive dissonance induced by catalytic tools) and are gratified by the way in which co-operation has raised the self-esteem of the participants so that they are less dependent on the teacher:

> "This aspect of co-operation comes through a lot in these classes. There doesn't seem to be the 'I can't do it'. They do feel confident in situations, it is OK to say to their friend 'I don't know how to do it can you help me?'"
>
> (School J, 3rd year interview)

Not only do the teachers learn more about their students directly through the conversations about the PVTs, the effect of the use of the tool on their students means that they are more able to stand back and reflect on the processes in their classroom and work out how and when they should intervene. In some instances, the views of teachers regarding particular students have been radically modified by the insight into learning furnished by the PVTs and in all cases the estimations of what their classes are able to do have been raised.

Student Feedback Influencing Schools

The quality and immediacy of the students' feedback on their learning which was generated by the use of PVTs was a powerful motivation for those teachers directly involved to continue using them with their classes. PVTs were also a means of influencing teachers not directly involved and so begin to have an impact at whole school level. As information about the use of PVTs began to be shared in staffrooms, at first anecdotally and then more

formally in case studies and in staff training, a teacher to teacher feedback loop was established. As with the feedback from students to teachers, the qualities of immediacy and explicitness of focus on learning processes meant that the PVTs were an effective vehicle for teacher to teacher dialogue. The accessible format of the PVT made it easy for teachers to learn about the work of their colleagues and the focus on students' accounts of their learning was of immediate interest. The teacher accounts of how they had used the PVTs were sufficiently convincing to serve as a warrant for action within their school and in some cases beyond the school.

Analysis of the extent to which the use of PVTs by individual teachers led to whole school initiatives reveals three types of engagement: the use of the PVT as supplied by the university team by single teachers in their classrooms and this being replicated in the classrooms of other teachers within the school; the use of PVTs more extensively and systematically within a school with some adaptation by the users; creative engagement with PVTs so that their potential is developed through teacher led innovation and the role of the PVT as a research as well as a pedagogical tool is acknowledged (see Table 2).

Insert Table 2 here.

Examples of adaptation include making use of PVTs as a structure for observations and feedback and as a means for communicating 'learning to learn' messages beyond the classroom (School G). In School H the use of PVTs were used to great effect as part of consultations with parents (author). Two schools in particular exemplify the catalytic properties of the PVTs, where teachers engage creatively with the tool, working to use it to meet their particular needs (author). The PVTs provided these teachers with multiple benefits: they were a way of gaining access to children's thinking; an opportunity to assess change and most importantly, an activity which made children's thinking explicit for the children themselves. This is reflected in the ways PVTs were customised for different occasions.

> "…[PVTs] have provided pupils with more extensive opportunities to explore their feelings regarding a wide range of issues …pupils have found them so valuable as a tool for exploring their learning, assessment and feelings"
> (School C, 3rd year case study)

Whilst these two schools were quite different in terms of their populations (School A serves an inner-city area with many compounding disadvantages including poverty, transience and a high proportion of families with English as an Additional Language, while School C serves a stable suburban community) both schools had senior management who supported experimentation and learner-focused change. The support for the use of PVTs across the school and the confidence to develop innovative forms of use stemmed from the recognition of the role they could play in empowering not only students but also staff as learners:

> "It's all about empowering children in the end, and that only happens if you empower the staff and that only happens if you believe in it strongly enough to sell it from the top" (School A, 2nd year interview)

Student Feedback Influencing Teacher Researchers

All of the schools participating in the L2L project were required to identify one, preferably two, staff who would act as lead researchers and fulfil the commitment to produce an annual case study. However, the extent to which teachers identified with the role of 'teacher-researcher' varied across the schools and was, in part, dependent on the level of support from both the senior management of the school and the Local Authority link adviser. We also found that the focus of the teacher enquiry and the methods used were factors in the development of the 'teacher-researcher' identity. In those schools were PVTs were used, it is possible to trace a trajectory for some individual teachers whereby the engagement with enquiry into student learning developed into a more sustained enquiry into pedagogy, their own professional learning and in due course, interest in educational research.

Teachers supported by tools such as PVTs expressed commitment to making their findings public so that their teacher enquiry began to acquire the characteristics that have been identified as indicative of the transition from individual, professional enquiry to research (Stenhouse, 1975). These teachers expressed a strong desire to spread the benefits of successful interventions and the templates provided a significant evidence base from which to do so:

> " [PVTs] produced some of the most insightful data and had had the most impact on other staff… Prior to our participation… we did not have the tools with which to measure children's views of their learning. We would often hear of, and trial, new initiatives in our classrooms. Having more concrete data with which to measure success has meant that [our initiative] has had an impact beyond individuals and even classes. [It] has impacted the school as an institution."
>
> (School A, 3rd year case study)

The confidence gained through the experience of sharing insights from the use of PVTs with colleagues in school resulted in teachers being willing to share their work with other teachers within the project and for some to go on to present their case studies at education conferences.

The lead teacher-researchers in the two schools in which we have characterised the use of PVTs as exemplifying 'creative engagement', both had experience outwith the L2L project which may have a bearing on their emerging identities as researchers. Within their schools, the two lead teacher-researchers held very different positions; in School A the lead teacher-researcher was the Headteacher and in School C the lead teacher-researcher was a newly-qualified teacher. Within the L2L project however, their engagement with PVTs was similar in its exemplification of confidence and creativity. Whilst we argue that the tool itself supports teacher learning as well as student learning, we also recognise that they shared elements of what could be termed social capital (Putnam 2000). Both teachers had parents with academic backgrounds in education and had considered working in a research environment as part of their longer-term career plans. These interests, in common as well

as other inter-personal qualities, enabled them to form strong social relationships with the University project director, thereby increasing their motivation to explore the research experience more deeply. This positive cycle of increased motivation and closer personal and working relationships with the University is often part of the hidden, 'taken for granted' background of research projects. Nevertheless, personal career plans and social capital were not sufficient in themselves and both teachers also had a strong orientation towards empowering learners, which was stimulated by the feedback from the students and encouraged them to use PVTs for further enquiry:

> "I was starting to think of ways in which I could involve children in not just understanding the process of learning, but also of them being able to measure the extent to which they felt they'd understood the process of the learning… involving them in the assessment of it"
> (School C, 2nd year interview)

Discussion

The model for practitioner research we used in the project (author) followed the tradition of Stenhouse's 'systematic enquiry made public' (1975; 1981). Teachers identified their own area of interest as well as their own intervention methods and the locus of control in deciding on the focus of pedagogical change was therefore firmly in the teachers' domain rather than that of the university based team. This reflects our explicit privileging of teacher intent and agency over elements of process and audience in our work with schools (author). The use of PVTs as a tool for enquiry in the classroom activated feedback loops between teachers and their students that provided support for the development of a metacognitively rich pedagogy. In this way the level of creative engagement lifted the PVTs beyond artefact status so that they became epistemic objects (Knorr Cetina, 2001): a part of the teachers' quest for understanding of the pupils' learning. The insights gained also triggered dialogue between teachers for whom the tools provided access to a depth of perspective which, in

turn, encouraged them to explore further not only through a new cycle of classroom based enquiry but also by beginning to engage with other sources of research evidence and, for some, participation in co-enquiry with colleagues from the university.

PVTs are sufficiently tentative to require testing in action through the teachers' experimentation and the interpretation of the outcomes involved genuine participation of everyone in the reaching of judgements regarding the significance of the data. Consequently, the PVTs supported the engagement of both teacher-researchers and the university team in co-enquiry. This interaction also involved developing the enquiry beyond the immediate context in order to take account of existing research and here the university team could play a key role in linking engagement *in* research to engagement *with* research (Temperley and McGrane, 2005; author).

Three stances towards teacher enquiry and research from the analysis of data on the teachers' use of PVTs in L2L can be identified and mapped onto existing models of educational processes (Stenhouse 1975) and learner autonomy (Ecclestone 2000) to form a matrix of ideas about teacher learning (Table 3).

Insert Table 3 here

The first stance is characterised by teachers ceding a greater degree of control to others in the research process, absorbing more passively messages about standards and norms for working and listening to information drawn form the research rather than engaging critically. In the second stance the university plays a role as 'knowledge brokers' mediating the codified academic discourse (McLaughlin, Black-Hawkins et al. 2004). For the teachers, their developing sense of self as agents within their own enquiries gives them 'permission' to engage more actively with the methods and products of research. In the third stance, there is greater resilience to any imposition of ideas, a more robust response to difficulties encountered and creative questioning regarding the purposes and value of any activity.

Considering the stances towards research identified in the matrix of ideas about teacher learning, leads to the question of the extent to which we are dealing with stages in a process. Whilst we are coming to see the stance towards research as potentially developmental, following Apter (Apter 2001) we also see motivation to engage in research as fluid, subject to constant change and influence by many factors, including the interaction between the tools, the context, and teacher characteristics.. The dynamic between enquiry into classroom practice and the widening of the enquiry by engaging *with* existing research has caused us to consider more carefully the extent to which a particular tool achieves catalytic potential through its intrinsic features, the classroom environment in which it is used or the characteristics of individual teachers. One limitation of our analysis of the use of PVTs is the lack of information at whole school level at our disposal. The focus in the L2L project has been on the autonomy of the teacher participants and the accounts of their experiences through the case studies and the broad brush school level data currently available requires further development. In the current, fourth, phase of the project we are gathering more cross project data at an institutional level. Analysis of issues such as the orientation towards teacher research and the organisational structures in place in each specific context will be facilitated by this round of data gathering in the final phase of the project.

Conclusion

The crucial process element of catalytic tools is the rate and precise nature of the feedback produced. The feedback from PVTs is immediate, context-specific and highly relevant to the teacher and learners' immediate needs: be they reflective, diagnostic, focused on knowledge, skills or affective elements of learning. The PVT works 'in the moment' as a teaching and learning tool but, used as a research tool, differences between individuals and groups, changes over time, discourse and evidence of metacognitive behaviours can all be investigated.

Exploring the use of PVTs in the context of the L2L project has endorsed the importance of student feedback for teachers' professional learning. The importance of providing teachers with accessible, practical, pedagogical tools to support change in the classroom is also reinforced; as are the benefits of enabling teachers to decide how to make use of any tools provided. PVTs have proven to be productive by permitting different levels of engagement whilst triggering multiple cycles of enquiry; student feedback to individual teachers, teacher to teacher dialogue about student feedback, teachers adopting a research stance to student feedback and co-inquiry with university researchers. In the L2L project we can see evidence for the importance of providing tools to support cycles of enquiry and so encourage a relationship between educational research and the pedagogy of the classroom that is not one of application but of co-operation:

> Both are practices in their own right, with different possibilities and different limitations, and each must inform the other.
> (Biesta and Burbules, 2003) p.108

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