The Use of Teacher Action Theories in the Articulation of Practice: The Use of Stencils in Upper NSW Primary Classrooms

Allan White
University of Western Sydney, Nepean
<al.white@uws.edu.au>

Research studies have reported upon the difficulties teachers' display in their articulation of classroom practice and teaching values. Other studies have reported inconsistencies between a teacher's espoused theory and their theory of action. Argyris and Schon (1974) claimed that behaviour was driven by individual action theories. This study used a modification of the Theory of Planned Behaviour (Ajzen, 1988) to uncover the teacher action theories regarding the use of stencils in primary mathematics classrooms from a selected sample of NSW upper primary teachers ($N = 115$). It will discuss these theories and their use in assisting teachers in their critical reflection and articulation of current practice.

The substantial body of research literature upon effective schools (Sammons, Hillman, & Mortimore, 1995) has moved to factors other than structures and resources to account for differences in student performance (Owens, 1998). One of these factors was the influence of the teacher. There have been attempts to quantify the importance of teachers towards student performance. Wyatt (1996) using a meta-analysis of over 80 British and Dutch school effectiveness studies suggested that only approximately 9 per cent of the total variance in student performance could be explained by the effects of attending different schools. Most of the variance was explained by differences attributable to membership of individual classes, which implied that it was teachers and not schools who made the difference in student learning. Other studies support this implication. For example, Hill and Rowe's (1996) study into school and teacher effectiveness and public examinations revealed that differences between classes and faculties within schools were larger than differences among schools. An Australian study also reported that the order of importance of factors in school effectiveness began with the staff, followed by ethos, curriculum and resources (Piper and McGaw, in McGaw, Piper, Banks, & Evans, 1992, p. 167). Thus it was not surprising that Ayres, Dinham and Sawyer (1998) in their summary of school effectiveness research stated "it has been seen that teachers and individual classrooms within schools are where attention should be focussed if effective teaching and student success is to be better understood" (p. 9).

While there was considerable research concerning novice and expert teachers (Berliner, 1994), there was also a problem with asking expert teachers to describe their classroom behaviour as:

> the expert might be characterised as often arational. Experts have an intuitive grasp of the situation and seem to sense in nonanalytic and nondeliberative ways the appropriate response to be made. They show fluid performance, as most people do when they no longer have to choose their words when speaking, or think about where to place their feet when walking ... When things are going smoothly, however, experts rarely appear to be reflective about their performance (p. 6022).

Perhaps as a result of a lack of reflection, experts and other teachers find it difficult to articulate what they do in the classroom. The issue of articulation of practice is not the only problem faced by research into teacher behaviour. There is a considerable body of research concerned with the linking of teacher beliefs with action (Pajares, 1992) Research studies have described inconsistencies between the two (Thompson, 1992). Does this mismatch arise only from the difficulties experienced by teachers in articulating their behaviour or are there other issues that deserve consideration?

Another problem is associated with a lack of research that focused upon either values or valuing (Bishop, 1999). It was suggested that one reason for this lack was that teachers were rarely aware of their teaching values and this had implications for teacher change. Values have been described as the deeply held beliefs that dispose a person to act in a certain way (Hill, 1991). Others regard values as deeper and more stable than beliefs or attitudes (Seah, 1999). In either case, there was agreement that values or value systems influenced both beliefs and attitudes, and that actions helped to communicate these values.

The difficulty for studies reported above concerned the link between beliefs and behaviour which was claimed to be a complex mix of intentions, attitudes, social influences, evaluations and motivations (Ajzen & Fishbein, 1980). Argyris and Schon (1974) stated that behaviour was driven by individual action theories. In their early research they identified and described espoused theories and theories-in-use and expected that individuals would not design and implement a theory-in-use which was significantly different from their espoused theory. What they discovered was quite the opposite. Not only were there significant differences between the two types of theories but "individuals develop designs to keep them unaware of the mismatch" (Argyris, 1993, p. 51). Thus, change could not occur until these theories were uncovered and made available for examination and reflection.

It has been noted that the aim of conventional mathematics instruction was the presentation of content in a linear fashion of carefully sequenced topics. This was then reinforced by the use of stencils and the mathematics textbook, which followed a similar format of skill building (Clarke and Sullivan, 1990, p. 165). While stencils are used extensively in NSW primary schools, there was little research available into the intentions, attitudes, beliefs of teachers and the use of stencils. A recent study (White, 1996) defined a prepared stencil as a teacher or commercially produced sheet containing a set of questions with spaces provided for working and/or answers. The results of this phenomenographical study identified and described a range of teacher beliefs for using and for not using stencils in an upper primary classroom. The results are contained in tables 1 and 2 below.

Table 1
Teacher Beliefs for Using Stencils

My decision to use stencils is because they:
1. would save time in preparation and marking.
2. would assist assessment and evaluation of whole class.
3. would assist the ranking of individual students.
4. would allow targeting of specific student needs.
5. would provide enrichment and extension activities.

However the study was unable to sort between beliefs that were the basis of teacher behaviour and beliefs that were the basis of teachers' espoused theories. The aim of this current paper is to discuss the use of teacher action theories (White, 1999) to assist the sorting needed by teachers in their articulation of current practice. By making explicit the complex mix of beliefs, attitudes, intentions and motivations that underpin classroom behaviour, teacher action theories provide a vehicle for uncovering and making available the basis of teacher behaviour for examination and reflection.

Table 2
Teacher Beliefs for Not Using Stencils

My decision to not use stencils is because they:
1. would waste paper and time - easier to use the blackboard
2. would not be relevant to some activities such as measurement
3. would be too narrow a medium - just the use of pen and paper
4. would be boring and repetitive
5. would not be suitable for students with weak reading and language skills
6. would make it easier for students to cheat

Theoretical Issues

Teacher Action Theories are based upon the Theory of Planned Behaviour (TPB; Ajzen, 1985, 1988) which is an extension of the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). Both have been very successful in using a small number of beliefs to predict behaviour across a wide range of contexts and both come from an objectivist (positivist) stance, which uses inferential statistical procedures. This stance has been the target of a great deal of criticism (see for example Lather, 1991) and it is beyond the scope of this paper to address this criticism.

The models TRA, TPB and Teacher Action Theory are described in detail in an earlier paper (White, 1999). In brief the immediate determinant of behaviour was intention and the three major factors that determined a teacher's behavioural intention were a personal or attitudinal component, a perceived control component and a social or normative component. The attitudinal component measured the teacher's attitude towards performing the behaviour and was "simply a person's general feeling of favourableness or unfavourableness for that concept" (Ajzen & Fishbein, 1980, p. 54). The normative component of the theory dealt with the influence of the social environment upon intention and behaviour. This was a measure of the teacher's perception of whether most important people supported or didn't support the performance of the behaviour. The third component was a measure of the degree of perceived control a teacher had over the performance of the behaviour. This implied that a teacher would usually intend to perform a behaviour that was positively evaluated, had the support of significant others, and was under control.

The three components could be investigated further. Attitude towards behaviour was determined by the product of the teacher's beliefs about the consequences of performing the action (behavioural beliefs) with an evaluation of the consequences (outcome evaluation). Subjective norm was determined by the product of the teacher's perceptions of social expectations to perform the behaviour (normative beliefs) and the motivation to comply with the perceived expectations (motivation to comply). The control component included either self efficacy beliefs that dealt with confidence in the performance of a behaviour or perceived behavioural control beliefs that dealt with the perception of control, and it was here that the model differed with TPB. Correlation data between the two items were very weak and suggested that the two items were not related linearly and were measuring two distinct concepts. As a result, the item that made the greatest contribution to explained variance was included.

Research into the domain of values, shared similar concerns with the desire to understand behaviour. Values are considered in the literature as deeply held beliefs that influence the individual to act in certain ways. Hill (1991, p. 4) proposed that there were three key elements to valuing:

1. A value could be described by a statement expressing a person's belief in an idea but judging its worth (value judgment).
2. The intensity of belief was considered to be the person's attitude.
3. The deeply held beliefs disposed a person to act in certain ways. These acts were consistent with the person's value system.

This set of propositions divided beliefs into two sets. Those beliefs that direct behaviour, are regarded as values, and which Argyris and Schön regard as contributing to an individual's theory-in-use. Those other beliefs that are not values, but are known by the individual, Argyris and Schön would regard as possibly contributing to an individual's espoused theory. Certainly, teacher action theories have used these ideas within its structure. For example, one construct of attitude was constituted from a product of both belief strength and outcome evaluation. Thus values proposed by Hill and others (Bishop, 1999; Seah, 1999) are beliefs reflected in action, and as such are a part of the basis of teacher action theories.

Method

A questionnaire was constructed according to TPB using six beliefs chosen from the positive and negative beliefs about the use of stencils. This was given to a sample chosen randomly from across the population of primary teachers who worked at a NSW Department of School Education primary school and who taught mathematics to years 5 and/or 6. A modification involved the inclusion of items to measure both self efficacy and perceived behavioural control of the teachers. The modification arose as a response to perceived confusion within the research literature (Fishbein & Stasson, 1990, p. 196). A total of 119 teachers returned the questionnaire and the data were entered into a spreadsheet and the software program Statview 4.0 was used to analyse the data. A decision was made not to include four returns because of the amount of missing data. The questionnaire construction is described in detail elsewhere (White, 1999). An attempt was made to collect data concerning performance of behaviour but it was possible for only 51 subjects of the sample.

Results

The demographic results of the sample if summarised using modal characteristics indicated that the teacher was most likely to be female, aged between 36 and 45, with 11 to 15 years teaching experience and with a class consisting of only year 6 students. The descriptive statistics of the constructs of the teacher action theory are listed in Table 3 and show that the majority of teachers intended to use stencils within the classroom.

The teacher action theory for the use of stencils is illustrated pictorially in Figure 1 and shows the correlation scores between the components of the model. They indicate a strong linear association between intention and attitude (r = 0.76), no linear association with subjective norm (r = 0.00) and a weak negative one with perceived behavioural control (r = -0.22). The correlation results involving the belief based measures showed a moderate linear relationship between normative beliefs and subjective norm (r = 0.45) and a weak one between behavioural beliefs and attitude (r = 0.26).

Table 3

Constructs of the Teacher Action Theory: Mean Values and Standard Deviations

	Mean	Standard deviation
Attitude toward behaviour		
Direct. DAI	1.8	3.9
Belief product. BBAI	11.7	13.0
Subjective norm.		
Direct. SND	- 0.1	2.9
Belief product. SNB	0.4	8.3
Control belief. PBC	2.5	0.8
Behavioural intention	1.0	1.5

Note. The table contains both the direct measures and the summed product measures of attitude and subjective norm. For attitudes the direct measure range is -9 to 9 and the product measure is -54 to 54. The subjective norm direct measure range is -3 to 3 and the product measure range is -36 to 36. The behavioural intention range is -3 to 3. The control belief range is -3 to 3.

Multiple regression analysis of the sample (N=115) revealed that taken together, attitudes, subjective norm and PBC accounted for 62.9% (adj. R^2) of the variance in intention to use stencils in the classroom. The partial standardised regression coefficients show a moderate influence between intention and DAI (β = 0.78, p < 0.0001), a weak negative influence by PBC (β = - 0.22, p < 0.001) and a very weak negative influence by SND (β = - 0.14, p < 0.05).

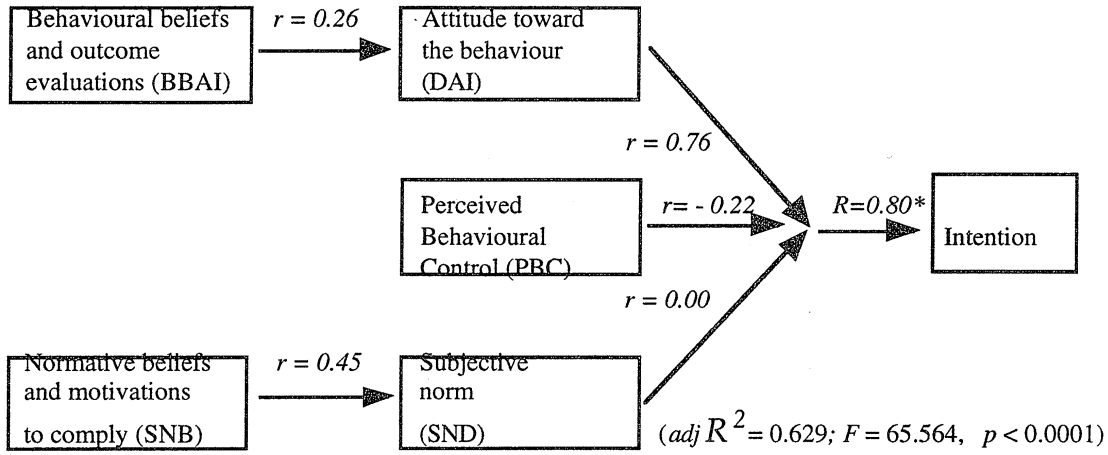

Figure 1. Teacher action theory for the use of stencils: Relations among beliefs, attitude, subjective norm, control and intention.

Attitude was the strongest contributor to intentions for the teacher action theories. In an examination of both components of attitude the high intent group revealed that they believed the use of stencils was:

1. likely to save time in preparation and marking which was regarded as a good outcome;
2. unlikely to be not relevant to some activities such as measurement and if they weren't relevant then this was a very bad outcome;

3. likely to assist the ranking of students which was a good outcome;
4. unlikely to be boring and repetitive and if they were then this was a very bad outcome;
5. quite likely to provide enrichment and extension activities – a very good outcome; and
6. not related to encouraging or discouraging cheating.

The high intent group reported that they received support from all four significant referents. They believed that the use of stencils in class was encouraged by the Principal, the Parents, the Students and the Other Teachers and that they were inclined to comply with this influence. Their strongest perception of encouragement was from the Parents. The teachers believed they had almost full control over the decision to use stencils, which they regarded as an extremely easy behaviour to perform.

The low intent group indicated they were:

1. undecided whether stencils would save time in preparation and marking which if it did happen was a good outcome;
2. undecided whether stencils were relevant to all activities and it would be an extremely bad outcome if stencils were used that were not relevant;
3. likely to agree that stencils wouldn't assist the ranking of students and if they did then it was a slightly bad outcome;
4. unlikely to agree that stencils would be boring and repetitive and if they were then it was an extremely bad outcome;
5. likely to agree that stencils provided enrichment and extension activities which would be a good outcome; and
6. unlikely to agree that stencils make it easier for students to cheat and if they did then it was a bad outcome.

The low intent group believed the use of stencils in class was discouraged by the Principal, the Parents, the Students and the Other Teachers. They indicated they were likely to comply with the influences of Parents and Students but were ambivalent about the other two. They also believed they had almost full control over the decision to use stencils and yet they regarded it as only slightly easy to perform.

Discussion

Teacher action theories were designed to provide a framework for understanding the basis of teacher behaviour. In general, the high intent group displayed greater belief in the positive beliefs of using stencils. Thus they were stronger in their beliefs that the use of stencils was likely to deliver the positive outcomes and they evaluated the outcomes of these positive beliefs much higher. The negative beliefs, they indicated, were unlikely to happen and they evaluated the negative belief outcomes less strongly. In contrast, the low intent group rated the positive belief outcomes as less likely to happen and the negative belief outcomes as more likely to happen. Their evaluations for the positive belief outcomes were weaker and the negative belief outcomes were stronger. They also indicated that their significant others discouraged stencil use in the classroom. For this group, the difficulties contained in the negative beliefs were too strong to make the effort to achieve the positive outcomes. Thus there are two distinct action theories and as a consequence, it is possible that the teacher action theories may be more effective if they included the full range of positive and negative beliefs rather than a sample. A greater degree of explained variance should be achieved. Thus examination of the quality of teacher action theories emerging from presentation of the full range of beliefs would be a future direction.

The low influence of subjective norm requires further investigation and could indicate that the volitional control of the teachers was high resulting in the construct of perceived behavioural control being small, which it was. There are a number of further research questions that arise. Are primary teachers existing in a professional isolation where there was little opportunity to watch other teachers at work or to be observed teaching themselves? Do teachers prefer isolation, regarding themselves as the expert in their classroom and ignore input from other sources thus confirming the 'closed door' syndrome (Haberman 1995 as reported in Lumpe, Czerniak, & Haney, 1998)?

In comparison to teacher action theories for other teacher classroom behaviours (White, 1999), for the use of stencils they were moderately strong in relation to the amount of explained variance. While the results have been a little disappointing, they have provided some directions for further development and reflection.

Conclusion

The inability to articulate successful teaching practice has serious educational implications.

> It follows that if such teachers experience difficulty in identifying what they do, and how they acquired their craft knowledge and skills, their chances of passing on this tacit knowledge must obviously be problematic, particularly due to the professional isolation that seems to characterise the operations of so many teachers who rarely have the opportunity to either watch other teachers at work or to be observed teaching themselves (Ayres, et al, 1998, p. 12).

Teacher action theories have the potential to provide a framework for the articulation of current classroom practice. The need for such a framework has been discussed in terms of the difficulties that teachers have exhibited in their attempts at articulating their practice. The educational implications of teacher action theories, however, go much wider than this need for description.

> problems of teaching and learning are not likely to be solved by attempting to prescribe how teachers and learners should approach their teaching and learning, but by developing techniques and ideas which will help teachers and learners critically reflect upon their present teaching and learning practices (Prosser, 1994, p. 39).

Thus in helping current and future teachers work towards practices that are consistent with the wider goals of the educational system, teacher action theories could play an important part. Teachers would benefit from an examination of the relationships between their beliefs, attitudes, intentions and behaviours. Teacher action theories provide a framework for understanding and discussing teacher behaviour. Early and continued reflection of teacher action theories and practice in both pre-service and inservice programs may provide a further strategy in the process of improving the quality of teacher classroom practice in the teaching of mathematics.

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