GUIDED REFLECTION ON TEACHING: A VYGOTSKIAN PERSPECTIVE

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This paper reports on procedures used to help student teachers reflect on their teaching. The major aim of the project was for student teachers to learn to use reflective processes before, during and after teaching a lesson, as a means of becoming more aware of their own knowledge and beliefs about teaching; and more self-regulative in monitoring and evaluating their work, and in setting goals for future lessons. To achieve this aim, a mentor helped subjects create feedback on their teaching by asking them questions which stimulated reflection. The interpersonal processes by which feedback on performance was provided form the focus of this paper. In particular, interest centres on attunement of student teachers to task feedback available, or deliberately sought, during the course of a lesson, and on reflection on the outcomes of teaching.

Ilgen, Fisher and Taylor (1979) have proposed a process model of feedback which incorporates three components of the interpersonal context: the source of the feedback, the message itself, and the recipient. Phases of the feedback process are affected by variations in these components. For example, perception and acceptance of feedback are greatest if the recipient is involved in formulating it (the recipient is one of the sources); the desire to respond may be increased by feedback which gives recipients a feeling of personal control; and feedback which is specific, rather than general, can help recipients form goals for future actions. All of these phases require the recipient to engage in reflection.

One way of examining a mentor's role in promoting the kinds of reflection implied above is suggested by Vygotsky's sociocultural theory of learning (Vygotsky, 1978; Wertsch, 1985). Vygotsky claimed that all higher mental functions within individuals have their origins in the social processes which occur between individuals. Interpersonal, or social, phenomena are transformed into intrapersonal, or mental, phenomena when communicative dialogue in an instructional environment is internalised as self-directive inner speech. This transformation represents a change from other-regulation to self-regulation. Internalisation may be hastened by teaching in the Zone of Proximal Development (ZPD), defined by Vygotsky as the distance between the student's actual developmental level as determined during independent problem solving, and the higher level of potential development as determined during problem solving under
adult guidance or in collaboration with more capable peers.

Research aimed at improving students' self-regulatory strategies by creating Zones of Proximal Development has been carried out in such domains as reading comprehension (Palincsar and Brown, 1984) and mathematical problem solving (Schoenfeld, 1985). It is proposed that the interaction between student teachers and mentor for the purpose of creating feedback is also an example of instruction in a Zone of Proximal Development. The possibility of teacher reflection occurring within a ZPD has received little attention. Hamann (1990), for example, has used some Vygotskian concepts in investigating conversational attributes of successful conferences between student teachers and their supervising teachers. However, the present study differs from Hamann's work in at least three ways: first, the purpose was to teach, rather than to simply observe, reflection and self-evaluation; second,

post-lesson discussions were guided by an independent mentor, not by the supervising teacher, and were additional to regular supervision conferences; third, the fact that four reflective interviews, rather than a single supervision conference, were analysed allowed developmental changes to be traced.

The next two sections describe the theoretical characteristics of instruction in the ZPD, and outline the research procedures used to guide student teachers' postlesson reflections. The third section shows how the interpersonal feedback processes occurring in the ZPD are translated into independent reflection, while the final section examines the effects of the guided reflection sessions on individual subjects' ability to reflect on their teaching.

How Can "Instruction in the ZPD" be Characterised?

Teaching and learning in the ZPD can be characterised as proleptic instruction (Stone and Wertsch, 1984), where the general term prolepsis refers to the assumption that something - in this case, a learner's competence in carrying out a task - is true before it is so. During proleptic instruction, mentor and learner jointly perform a task the learner cannot yet complete alone, while engaging in a form of communication which requires the learner to construct his/her own interpretation of the mentor's unstated instructional message (Forman, 1989).

In practice, the structure and function of instruction in the ZPD can be described respectively as scaffolding and internalisation.
Expert scaffolding provided by the mentor is a form of other-regulation in which the learner is led through strategic steps in the task. This guidance is effected by interactive dialogue, through which the mentor structures the task to allow learners to participate to whatever extent they are able (Palincsar, 1986). Another type of scaffolding makes use of mediating tools, such as record keeping and representational devices which further stimulate dialogue (Resnick, 1989). Whatever the type of scaffolding, the mentor's role in providing assistance has three essential features:

1. responsiveness - the level of assistance is tuned to learners' needs;
2. contingency - the level of assistance is contingent upon learners' performance, and should be the minimum level needed to enable the learner to proceed;
3. flexibility - the quality and quantity of assistance changes over time as learners assume more responsibility for carrying out the task.

While dialogue and representational tools help structure the interaction between mentor and learner, they also implicitly signal the salient features of the task. By recognising and understanding the purpose of the strategic actions they have been led to carry out, learners come to internalise the mentor's definition of the task's goals and strategies.

Communicative, mental and instructional processes in the ZPD are represented in Figure 3.

Figure 3 - Communicative, Mental and Instructional Processes in the ZPD

Procedures for Guiding Reflection

The research design provided for three groups of student teachers: a control group and two experimental groups. All subjects completed a set of questionnaires and tasks before and after their practice teaching experience. Subjects in the experimental groups were also observed as they taught a number of lessons throughout the practicum, and were interviewed after these lessons. (Full details are provided in the first paper of this symposium). Only the interviews conducted with the main Experimental Group D are discussed here.

Instruments and Methods

Two separate interview procedures were used to guide student
teachers' post lesson reflections. Two Special Reflection Sessions were conducted, once in the final week of each practice teaching block. Subjects also took part in two Reflective Interventions during the early stages of the second block of practice teaching (see Table 2). Both interviews were scripted, but only to the extent of providing the mentor with a framework of opening questions. Follow up of subjects' responses was left to the discretion of the interviewer, and the discussions often moved in unplanned, but fruitful, directions.

In the Special Reflection Sessions subjects were first asked for their own general evaluation of the lesson outcomes, and then questioned on their specific goals and factors which influenced their choice of goals, teaching methods and factors which influenced their choice of method, use of feedback during the lesson, achievement of goals, any new perceptions regarding their beliefs about teaching and teaching methods, and goals for future lessons. The main purpose of this interview was unobtrusively to draw out subjects' own thoughts about the lesson, and about teaching and learning in general. The procedure was guided by the model presented in Figure 1.

The Reflective Intervention interview guided subjects through a strategy for analysing and evaluating their lesson, by focussing on four aspects of student learning:

Engagement and Involvement (students' attitude to learning);
Learning Processes (how students learn);
Progress (how well students learn the content of the lesson);
Social Context (the environment in which students learn).

These four categories relate both to the student teachers' understanding of the teaching task and the teaching context.

For each aspect of learning, subjects were questioned on:

their expectations or goals;
the actions they took to achieve their goals;
opportunities they created to obtain feedback on student learning;
indicators (observed during the lesson) that their goals were being met.

These four categories relate specifically to Boxes E, G and I of Figure 1, and also to their knowledge, beliefs and skills.

As the intervention progressed, subjects recorded their responses in the appropriate cell of the Reflection Card (Figure 2) and
critically evaluated their own performance. Finally, subjects were asked how they might modify their goals and actions in future lessons. Unlike the Special Reflection Session, this interview was intended to challenge, rather than simply discover, the way subjects thought about teaching.

Interviews were conducted as soon as possible after the lesson had been taught and observed, and lasted from thirty to forty-five minutes. All interviews were audiotaped and later transcribed.

As Vygotsky's theory considers that learning results from communication in a supportive social context, the next section examines some communicative and social features of the interview procedures.

Communication
The dialogue in which interviewer and subjects engaged could be viewed from two perspectives: linguistic and instructional.

Linguistically, the dialogue shared many of the features of teacher-led whole class or small group discussion, such as tracking, clarifying and summarising (Dillon, 1988; Howe, 1988; Watson and Young, 1986). However, the interviewer's contributions were also responsive, contingent and flexible in the manner of scaffolded instruction. Both perspectives are represented in four key roles played by the interviewer: listener, questioner, mirror and model. Of these, the first three were common to both interview procedures, while the last appeared only in Reflective Interventions.

Careful listening was essential if the interviewer was to keep track of the history of the discussion; for example, subjects' responses early in an interview were often revisited at a later stage and explored more fully. The interviewer also needed to pay close attention to subjects' responses in order to formulate contingent follow up questions. In addition, listening signalled to the student teachers that their reflections were valued.

Questioning, in order to be responsive to subjects' needs for assistance, necessarily went beyond the prepared interview script. For example, follow up questions encouraged the student teachers to add more information to their initial responses or to elaborate on the thinking behind their reported actions.

Mirroring statements made by the interviewer served several purposes (often simultaneously). First, by distilling and summarising the main ideas of the discussion as it progressed,
the mentor could check her understanding of the subjects' thinking. Second, particular responses which had been elicited separately over a period of time could be drawn together and reorganised, thus creating a logical structure for subjects' ideas. Third, paraphrasing subjects' responses allowed the interviewer to introduce new vocabulary and offer a common language for reflection. Finally, the interviewer could amplify brief or superficial answers to follow up questions by giving a richer interpretation of these responses.

Mirroring statements thus indirectly modelled ways of reflecting on the lesson by repeating, modifying or elaborating on subjects' responses. In Reflective Interventions, the interviewer could additionally make more direct modelling statements if student teachers were unable to produce responses to questions regarding expectations, actions, feedback opportunities or indicators.

Social Context
The relationship between mentor and student teachers had some features - such as confidentiality, empathy and trust - which are desirable characteristics of any unstructured or semi-structured interviews in social science research (Burgess, 1984). Perhaps the most significant elements of the social context surrounding the reflective interviews were the non-evaluative nature of the lesson observations and interviews, and the time devoted to the post-lesson dialogue. Subjects frequently commented that the mentor's visit afforded a unique opportunity to reflect on their teaching, in some detail, with the help of someone who was knowledgeable enough to ask probing questions, but who was not responsible for assessing their performance. This perception of the mentor as an empathetic outsider may have increased the subjects' willingness to reveal their thoughts and acknowledge their weaknesses.

Creating a ZPD for Guiding Reflection

In the previous two sections the characteristics of instruction in the Zone of Proximal Development were briefly described, and procedures for conducting Special Reflection Sessions and Reflective Interventions were outlined. The next section draws these strands together to show how the research procedures simultaneously provided strategic assistance and signalled salient features of the task to create a ZPD for guiding student teachers' post-lesson reflections.

Providing Strategic Assistance (Scaffolding)
Two types of scaffolding structured the interaction between
mentor and subjects: both forms of reflective interview consisted of scaffolded dialogue, while Reflective Interventions were mediated by a scaffolding tool in the form of the Reflection Card.

A more detailed picture of scaffolded instruction is offered by Tharp and Gallimore (1988), who have constructed a coherent theory of teaching based on Vygotskian principles. They describe several methods of assisting performance, of which four seem to be particularly relevant to the mentor-student teacher interaction: cognitive modelling, feedback, questioning for assistance, and cognitive structuring. Table 5(a) relates these scaffolding methods to the communicative roles assumed by the mentor.

Table 5 - Interview Procedures: Creating a ZPD for Guided Reflection

<table>
<thead>
<tr>
<th>SPECIAL REFLECTION SESSION</th>
<th>REFLECTIVE INTERVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) PROVIDE STRATEGIC ASSISTANCE</td>
<td>Dialogue</td>
</tr>
<tr>
<td>(SCAFFOLDING)</td>
<td></td>
</tr>
<tr>
<td>Questioning, mirroring</td>
<td></td>
</tr>
<tr>
<td>Questioning, mirroring, modelling</td>
<td></td>
</tr>
<tr>
<td>statements</td>
<td></td>
</tr>
</tbody>
</table>

2. Feedback

| Provide information on(i) Teaching: S. Response to questions |
| (i) S's responses to questions |
| performance | Mirroring (summarising) |
| Mirroring (summarising) |
| Reflection Card |

| (ii) Reflection: Mirroring (summarising) |
| (ii) Mirroring (summarising) |

| Compare with performance (i) Teaching: Nil |
| (i) Implicit |
- revealed during standard self-evaluation

(ii) Reflection: Mirroring (structuring, paraphrasing, amplifying) Modelling statements

Implied by structure of Reflection Card

3. Questioning for Assistance Questioning

Questioning

(Follow up was responsive, contingent, flexible) 4. Cognitive Structuring

Structures for explanation

Structures for cognitive activity

(b)

Interview structure (centred on goals) Reflection Card Mirroring (structuring) Mirroring (structuring)

Interview questions articulate and Reflection Card analysis, justify goals and methods evaluation, goal setting

SIGNAL SALIENT TASK FEATURES Questioning Questioning and Reflection Card
(leads to Internalisation)

Awareness
Analysis
Evaluation
Goal setting
Cognitive Modelling is the process of offering cognitive strategies for imitation. Mention has already been made of the mentor’s mirroring and modelling roles in demonstrating ways of reflecting on the lesson. In addition, the interviewer's questions provided a model for self-questioning - another important form of inner speech.

Feedback provides information on performance so that a comparison can be made with a performance standard. In the context of the post-lesson interviews, feedback on teaching actions was jointly constructed by interviewer and subject. Information on their teaching performance was provided by the subjects themselves in response to questioning, and by the mentor's mirroring-summarising statements. During Reflective Interventions subjects also used the Reflection Card to record information on their performance. The interviewer refrained from setting performance standards for teaching. Instead, subjects revealed their own implicitly held standards as they were guided through the self-evaluation component of the Reflective Intervention.

The post-lesson interviews also provided student teachers with feedback on a more subtle aspect of performance - their own reflective processes. In this case the interviewer did establish performance standards, via direct modelling of appropriate responses or mirroring statements which structured, paraphrased or amplified the subjects' responses. A further performance standard was implied by the row and column structure of the Reflection Card.

The third form of scaffolding was questioning for assistance. Tharp and Gallimore (1988) distinguish between this form of questioning, which moves students towards their potential level of development, and questioning for assessment, whose purpose is simply to discover students' actual level of development. In both types of post-lesson interview, questioning for assistance (especially unscripted follow up questions) was intended to provoke reflective mental processes the subjects would not have produced alone.

The final means of providing strategic assistance was cognitive structuring. Two types of cognitive structure were created:

1. Structures for explaining experience. Both forms of interview were structured to help subjects organise their perception of the lesson. For example, the script of the Special Reflection Session began with subjects' goals as the central reference point to which most subsequent
questions were linked. The Reflection Card was a more concrete organisational device which allowed subjects to record the main features of the lesson in a coherent, condensed form. Some of the mentor's mirroring statements also structured subjects' reflections.

2. Structures for cognitive activity. The Special Reflection Session required subjects to articulate and justify their goals and teaching methods, and increased their awareness of factors influencing their choice of goals and methods. The structure of the Reflection Card acted as a stimulus for such self-regulatory activities as analysis, evaluation and goal setting.

Signalling Salient Task Features
Salient features of the post-lesson reflection task were implicitly defined by the interview questions put to the subjects. The Reflection Card also highlighted aspects of learning (engagement, learning processes, progress and the social context) and teaching (goals, actions, feedback and indicators) which the mentor deemed important.

Strategic behaviours elicited by the Special Reflection Sessions and Reflective Interventions included:

1. Awareness - recognise and explain factors influencing choice of goals and teaching methods;
2. Analysis - compare teaching methods with the goals they were intended to achieve; recall indicators of goal achievement that were available during the lesson (task feedback);
3. Evaluation - determine whether lesson goals were achieved; consider the effectiveness of teaching methods;
4. Goal setting - set goals for future lessons (Table 5(b)).

Assessing Learning in the ZPD

Because instruction in the Zone of Proximal Development uses scaffolded dialogue to help students internalise the teacher's task definition, it is reasonable to ask two questions when assessing learning in the ZPD:

1. How effective was the provision of scaffolding?
2. To what extent did internalisation occur?

The first question concerns (interpersonal) communication processes, while the second refers to (intrapersonal) mental
processes (see Figure 4). Each will be addressed separately in order to determine the success of the reflective interview procedures.

Communication - How Effective was Scaffolding in Promoting Reflection?
Newman, Griffin and Cole (1989) have introduced the term dynamic assessment to distinguish between assessment by teaching in the ZPD, and the more traditional form of assessment while teaching. Dynamic assessment differs from traditional assessment in its unit of analysis, goals and methods (Table 6). One way of measuring the effectiveness of scaffolded instruction during the Reflective Interventions is to examine changes over time in the level of assistance provided by the interviewer.

Table 6 - Differences between Traditional Assessment and Dynamic Assessment

<table>
<thead>
<tr>
<th>Traditional Assessment</th>
<th>Dynamic Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Assessment while teaching</td>
</tr>
<tr>
<td></td>
<td>Assessment by teaching</td>
</tr>
<tr>
<td>Unit of Analysis</td>
<td>Unit of Analysis</td>
</tr>
<tr>
<td></td>
<td>Individual student Interaction in ZPD</td>
</tr>
<tr>
<td>Goal</td>
<td>Establish student's actual level of development</td>
</tr>
<tr>
<td></td>
<td>Establish student's potential level of development</td>
</tr>
<tr>
<td>Method</td>
<td>Measure student's competence, via individual's successful performance of task</td>
</tr>
</tbody>
</table>
Observe how much/what kind of help student needs to complete task successfully

Figure 4 - Assessing Learning in the ZPD

Changes in the Level of Assistance
Transcripts of the Reflective Intervention interviews were analysed to show how much, and what kind of, help the subjects received in completing the Reflection Card. The analysis concentrated on the completeness of subjects' responses to the mentor's initial (scripted) questions, and the type of follow up provided by the mentor (see Figure 5).

Responses were classed as none, incomplete or complete. In order to be contingent upon subjects' performance and responsive to their need for help, the interviewer's respective follow up moves provided maximum, minimum or no assistance. The first two types therefore elicited prompted responses, while the third type of follow up corresponded to unprompted responses (see Figure 6). If there was no response to the initial question, the interviewer clarified the

Figure 6 - Levels of Assistance and Classes of Response During Reflective Interventions

<table>
<thead>
<tr>
<th>COMPLETENESS</th>
<th>TYPE OF LEVEL</th>
<th>OF INITIAL FOLLOW UP</th>
<th>ASSISTANCE RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rephrase-Clarify</td>
<td>Maximum</td>
<td>No Response</td>
<td>Assistance</td>
</tr>
</tbody>
</table>

Indirect Telling

Prompted Responses
Direct Telling

Prompt-Add
Incomplete Minimum
Response Assistance

Rephrase-
Extend

Probe-Explore

Complete
Response

None (solicited
answer) No Unprompted
Assistance Responses

question or modelled an appropriate answer. The initial question
was also rephrased and clarified if the subject had made an
irrelevant response. Incomplete responses were met with follow
up questions that encouraged the subjects to add to or elaborate
on their answers. No follow up was necessary if the subject gave
a complete response to the initial question, or unwittingly
answered a scripted question not yet asked.
The number of instances of each type of follow up over the two Reflective Interventions was recorded for each student teacher. Results are given in Table 7. Column 1 shows the percentage of total responses given with maximum, minimum and no assistance. In Column 2, the maximum and minimum assistance figures have been added together to indicate the percentage of responses which were prompted. The ratio of % prompted to % unprompted responses shows that five of the eight subjects - Christine, Frances, Cheryl, Matthew and Mike - received less assistance in the second intervention, about a week later, than in the first; that is, they were able to assume more responsibility for completing the reflection task unaided. These results suggest that scaffolding was effective in promoting reflection in at least five cases. However, there is additional evidence of successful scaffolding for a further two subjects - Alison and Damien. This evidence concerns the manner in which the mentor adjusted the difficulty of the reflection task.

Table 7 - Changes in Level of Assistance : First and Second Interventions

<table>
<thead>
<tr>
<th>Subject</th>
<th>1st Level of Assistance (%)</th>
<th>1st Class of Response (%)</th>
<th>2nd Level of Assistance (%)</th>
<th>2nd Class of Response (%)</th>
<th>No. Unsolicited Reflective Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alison</td>
<td>14 25 61 39 61</td>
<td>6</td>
<td>13 35 53 48 53</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Christine</td>
<td>38 39 23 77 23</td>
<td>2</td>
<td>29 26 45 55 45</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Maggie</td>
<td>17 22 61 39 61</td>
<td></td>
<td>37 13 50 50 51</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Changes in the Level of Task Difficulty
Because the goal of dynamic assessment of learning in the ZPD is to establish the student's potential level of development, the teacher cannot assume a preconceived standard the student should reach. Neither can the pathway through the task be known in advance. The ZPD may be more correctly characterised by "looking for where a student can go with a little help than with quantifying the amount of help needed to reach a standard endpoint" (Newman, Griffin and Cole, 1989, p88, emphasis added). Thus, scaffolding involves not only offering appropriate assistance when students are unable to proceed, but also extending the upper bound of the ZPD for students who are proceeding successfully by increasing the difficulty of the task. The latter variety of scaffolding is illustrated by comparing the Reflective Intervention responses of Alison and Damien with those of...
of Christine and Frances.

Column 2 of Table 7 shows that Alison and Damien received more assistance in the second intervention than the first (proportion of prompted responses increased from 39% to 48%, and 64% to 67% respectively); while Christine and Frances received less (proportion of prompted responses fell from 77% to 55%, and 76% to 54% respectively). However, Table 8 presents a more detailed picture of the type of help provided by the interviewer. Note that in the second intervention, the assistance received by Alison and Damien contained a higher proportion of Probe follow ups (23% and 17%) than in the first (14% and 0%); while the opposite is the case for Christine and Frances (14% and 6%, decreasing to 3% and 8%). The interviewer has therefore increased the difficulty of the reflection task for Alison and Damien by asking more Probe follow up questions, which pressed them to elaborate on, explain and justify their initial responses.

Table 8 - Percentage of Total Responses Obtained with "Minimum Assistance" Follow Up (Alison, Damien, Christine, Frances)

<table>
<thead>
<tr>
<th>First Intervention</th>
<th>Second Intervention</th>
<th>Subject</th>
<th>Prompt</th>
<th>Extend</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
<td>(%)</td>
</tr>
</tbody>
</table>

Probe Prompt Extend Probe Alison 3
(%) (%) (%) (%)

8 14 0 13 23 Damien

25 17 0 14 12 17

Christine 16 9 14 10 13 3

Frances 19 33 6 4 0
The interviewer's decision to tailor her assistance in this way may have been influenced by two aspects of the student teachers' performance in completing the Reflection Card:

1. In the first intervention, Alison and Damien were able to give a higher proportion of unprompted responses (61% and 36% respectively) than Christine and Frances (23% and 24%). This suggests that the first two subjects were coping more successfully than the other two with their initial attempt at the reflection task.

2. Alison and Damien made more unsolicited reflective statements than Christine and Frances (see Column 3 of Table 7). These statements were not related to any of the scripted intervention questions, and suggested that the first two subjects were spontaneously reflecting on, analysing or evaluating the lesson.

Thus, by closely monitoring the subjects' contributions to the dialogue, the interviewer seems to have judged that Alison and Damien - but not Christine and Frances - were capable of moving to a higher level of reflective performance, if given a little help in the form of Probe follow up questions.

Summary
The mentor's scaffolding effectively promoted reflection during the interventions by tailoring assistance to match subjects' needs. For five of the eight subjects, the quantity of assistance decreased over time as they assumed more responsibility for completing the Reflection Card; for a further two subjects who showed early signs of spontaneous reflection, the quality of assistance changed as they were pressed to reflect even more carefully on their teaching.

Mental Processes - To What Extent did Internalisation Occur?
Evidence for internalisation would be provided by signs that subjects were engaging in reflection independently of the mentor's assistance. Converging evidence from several sources suggests that four student teachers - Alison, Damien, Matthew and Cheryl - internalised salient features of the post-lesson reflective interviews. The evidence includes:

1. The high number of unsolicited reflective statements made by these subjects during both Reflective Interventions (see Table
2. Reflection Maps from the first and second Special Reflection Sessions, which show increased awareness of factors influencing teaching goals and methods and a change from external to internal influences (see Appendix 1).
3. Feedback Diagrams from the first and second Special Reflection Sessions, which show increased analysis, evaluation and goal setting resulting from reflection before, during and after the lesson (see Appendix 2).

The significance of unsolicited reflective statements has already been described in the previous section. It is beyond the scope of this paper to present a full analysis of the remaining evidence; instead, the nature of the analyses and the extent of change over time will be illustrated for each of the four student teachers mentioned above.

Awareness: Matthew and Cheryl
Analysis of the interview transcripts for the two Special Reflection Sessions identified three general types of influence on subjects' decisions regarding teaching goals and methods:

1. External factors - nature of the lesson content, time constraints, the Supervising Teacher's instructions or example, resource availability, school assessment requirements, and the syllabus or work program.

2. Internal factors - beliefs about teaching and learning, knowledge gained from the Diploma in Education course, reflection on previous lessons, and the subjects' own experience as a school student.

3. Student characteristics - ability, age, motivation, behaviour.

The Reflection Maps of Matthew and Cheryl (Appendix 1) provide a qualitative representation of these influences. The structure of the maps is derived from the interview's scripted questions, while their content is supplied by the subjects' responses to questioning. As well as becoming more aware of their reasons for teaching the lessons as they did (the number of factors mentioned increased from the first to the second interviews), Matthew and Cheryl also became more strongly influenced by internal factors (self-regulated) than external factors (other-regulated).

Although the Reflection Maps mostly speak for themselves, there are several points worth mentioning about the differences between
Matthew's first and second maps (both of which refer to the same Year 8 Science class). For example, the first map shows that Matthew's beliefs about teaching and learning had virtually no influence on his choice of goals and methods; by the end of the second practicum, however, his teaching method was consistent with his beliefs and he was putting his theories into practice. The second interesting change concerns the major constraints of time limitations, student behaviour, and the Supervising Teacher's conservative teaching methods. While these factors were important influences on goals and methods in the first map, in the second map they are deliberately set aside. Matthew considered these constraints to be less important than the goal of helping all students to understand atomic structure, and he therefore went ahead with his potentially risky plan to take the students outside the classroom, assign them the roles of protons, neutrons and electrons, and instruct them to physically "create" atoms of various elements. Finally, note Matthew's changing interpretation of his own experience as a school student. To begin with, he unreflectively drew on this experience to reproduce the familiar "chalk and talk" lesson of his school days. By the time of the second interview, he had reflected on his negative experience of passive learning and rejected the methods by which he himself had been taught.

Analysis, Evaluation, Goal Setting: Alison and Damien Transcripts of the Special Reflection Sessions also provided information on the extent to which subjects had used feedback and reflective processes before, during and after the lesson to analyse and evaluate their teaching and set goals for future lessons. The role of these processes in any single lesson can be represented in a Feedback Diagram of the general form shown in Figure 7. The structure of Feedback Diagrams is derived from the model of feedback and reflection proposed in the earlier symposium paper (Figure 1).

Alison and Damien's Feedback Diagrams for the lessons associated with the first and second Special Reflection Sessions indicate that they substantially increased their use of feedback and reflection (Appendix 2). For example, in his first interview Damien had great difficulty recalling any instances of monitoring the progress of the lesson and could only express goals for future lessons in the vaguest terms. By comparison, his Feedback Diagram for the second interview demonstrates that he made more use of indicators during the lesson to check on student learning and modify his own actions, and he was able to reflect extensively on the lesson outcomes to set future goals for himself and his students. Damien's choice of teaching method for
this lesson was also influenced by his positive evaluation of a new approach tried out in an earlier lesson.

Figure 7 - General Form of Feedback Diagrams

Although a similar pattern of change over time is evident in Alison's Feedback Diagrams, one important change in her use of feedback during the lesson deserves further elaboration. Like Damien, Alison was barely conscious of having carried out any monitoring or checking actions in the earlier of the two lessons (Appendix 2.1). For the later lesson, however, Alison deliberately chose her teaching method so as to maximise opportunities to obtain feedback on students' learning. After realising that many in her Year 12 Chemistry class had not understood the practical implications of electrochemical theory presented in the previous lesson, Alison prepared an experimental demonstration of the differences between electrochemical and electrolytic cells. Instead of performing the demonstration herself, she gathered the students around her at the laboratory bench, selected individuals to construct various types of cells, and questioned them closely to gauge their understanding. The students' responses provided a constant flow of feedback which helped her to formulate further questions and explanations. Thus, Alison did not simply notice more indicators of student learning in this lesson: she had planned the whole lesson around seeking indicators and using them to regulate her teaching actions.

Summary
Four of the eight subjects showed signs of having internalised the reflective processes elicited by the interview procedures. In particular, analysis of the first and second Special Reflection Sessions suggests that these subjects became more internally influenced (self-regulated) in their choice of goals and methods, made more use of feedback during the lesson to monitor and evaluate progress, and were better able to articulate future goals for themselves and their students.

One further question needs to be considered: if the post-lesson interviews provided effective scaffolding for seven student teachers, why does it appear that only four of them went on to internalise the reflective strategies they were led to use?

Scaffolding Without Internalisation
Some subjects may have participated in the guided reflection
interviews without learning how to use reflective processes independently. In order for internalisation to occur, the subject must be motivated to create the understanding of the task and its goals invited by the mentor, see the purpose of the strategic behaviour elicited by the mentor's questioning, and be actively engaged in the communicative exchange of the interviews (Stone and Wertsch, 1984). Motivation, purpose or active engagement may have been lacking in the subjects who experienced scaffolding without internalisation. On the other hand, these subjects might have internalised features of the task that were different from those the mentor thought she was signalling. Perhaps they viewed their role in the interviews as passively providing information, rather than explaining, evaluating and changing their beliefs and actions.

One further possibility which should not be discounted is that internalisation did occur, but was not detected at the time of the post-lesson interviews. The only direct evidence for independent reflection comes from subjects' responses to interview questions: such verbal methods of collecting data on thinking suffer from a number of limitations, one of which concerns subjects' inability to describe the cognitive processes of interest to the researcher (Ericsson and Simon, 1980; Genest and Turk, 1981). Thus, some student teachers may have failed to report on the reflective processes they actually used before and during the lessons observed. Similarly, subjects could have reflected independently on the lesson outcomes some time after the interview had taken place. A final judgment on the extent to which internalisation occurred should therefore take into account indirect evidence of increased reflection provided by the pre and post questionnaires and tasks.

Summary

In this paper, the process of helping student teachers use reflection to create feedback on their teaching has been presented as an example of instruction in the Zone of Proximal Development. Procedures for guiding reflection cast the interviewer in the roles of listener, questioner, mirror and model - roles which allowed her to provide scaffolded assistance in leading subjects through structured reflection tasks, while simultaneously emphasising important aspects of teaching and learning. The effectiveness of the interview procedures was assessed by examining changes in the quantity and quality of help provided by the interviewer, and evidence that subjects had internalised reflective processes practised during the interviews. Guided reflection, as it has been described here, may be an effective method for helping student teachers make use
of task feedback during lessons, and learn from lesson outcomes.