

# *'Intense, but it's all worth it in the end': the colearner's experience of the research process*

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**ABSTRACT** *Detailed enquiry into the learning process requires in-depth case studies of individual learners. Such research involves the informants in considerable time commitments, as well as the risk of exposing their personal limitations as learners. This can be informative for the researcher, but could also be threatening and demoralising for the 'subject'. Such issues are especially significant for practitioner-researchers, where there is the potential for conflicts of interest due to the dual teacher–researcher role. This article discusses one study where a simple ethical framework was explicitly employed to protect the interests of the learners. The informants were conceptualised as 'colearners' who should feel they benefited from their involvement, and opportunities were taken to collect simple feedback on their perceptions of research activities. The value and limitations of such data are considered. The wider significance of the colearners' comments, and the potential methodological repercussions of prioritising the 'ethical imperative' are discussed.*

## **Introduction: Some Ethical Concerns in Using Learners as Research Subjects**

This article describes one aspect of a research project which investigated learning in science, but its concerns are those of any researcher (especially any teacher–researcher) using learners as sources of data. The particular project discussed (Taber, 1997) may be seen as part of an extensive research programme which has explored learners' thinking in science (Gilbert & Swift, 1985). As a result of this effort, a great deal is known about learners' ideas in many science topics (e.g. Driver *et al.*, 1994). Increasingly, the focus of the research programme has switched from cataloguing learners' misconceptions, to investigating *in depth* how their ideas change over time (Taber, 2000a); the present study was of this latter type (Taber, 1997, 2001a).

By definition, all research into learners' ideas uses learners as informants. Pupils and

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students are the ‘research subjects’, and our research makes demands of them (Cooper, 1993, p. 325). The contribution made by these informants varies greatly, depending on the nature of the research. In some cases—for example, where data are collected from a large number of learners by simple written test instruments—the input from each informant is minimal. However, at the other extreme, detailed case studies of individual learners may involve significant amounts of their time. The research techniques likely to be employed in such cases are also potentially more demanding. Learners may, for example, undertake face-to-face interviews with a researcher in a clinical setting, rather than completing an anonymous questionnaire in familiar surroundings as part of a class exercise.

It is common for enquiry into learners’ ideas to be undertaken for the assumed benefit of the researcher, the educational research community and (hopefully) future generations of learners—with little thought to what the ‘subjects’ themselves take away from the experience. Research may be carried out in schools by ‘outsiders’ who are unknown to the young people subject to their scrutiny, and who may ‘treat schools simply as data collection sites’ (Zajano & Edelsberg, 1993, p. 152). This may be seen to fit a common research pattern that has been described as the ‘rape model’, where ‘the researcher comes in, takes what he wants, and leaves when he feels like it’ (Lincoln, reported in Beld, 1994, p. 107). Whilst this has often been judged as acceptable, in pursuit of the greater good, there are clearly ethical issues to be considered.

This objection may be avoided *to some extent* when the researcher is a classroom teacher working with her or his own students. Often, such practitioner–researchers would be considered to be undertaking action research: as participants in the educational process, intervening to bring about change because they have identified as problematic some aspect of existing practice (e.g. Carr & Kemmis, 1986; Hitchcock & Hughes, 1989; Whitehead, 2000). However, as will be considered, being a practitioner–researcher may bring its own complications.

### *Do Benefits Outweigh Costs for the Informant?*

As Cooper (1993, p. 325) has suggested, as researchers, we need to ‘acknowledge the demands that our intentions place on our subjects’, and recognise that our research questions may not seem important to our informers. Limerick and co-workers suggest, for example, that the research interviewer should ‘conceptualise the interview as a *gift* of time, of text, and of understanding, that the interviewee gives to the interviewer’ (Limerick *et al.*, 1996, p. 458). Moje (2000) has argued that researchers should seek to ‘make positive change in the lives of those who participate in research’, ‘positive’ in the sense of being desired by the participants, rather than judged desirable by the researchers.

It might be suggested that before any learner is ‘investigated’, a cost–benefit analysis should be undertaken to determine:

- what will the informant be asked to *give* to the study?
- what benefit will the informant *gain* from the study?

The cost may not just be in time and effort, but may also be in emotional terms, for—as will be discussed—being an informant in an interview study can be an intense experience. There is also the issue of *who* should judge whether the learner will benefit, and whether this makes taking part worthwhile. For those who are legally children, there is a question as to what extent this is a decision for the pupil, or their parents/guardians,

or for the teacher acting *in loco parentis* (cf. Ruddock & Flutter, 2000). When there is no obvious benefit to the learner, altruism might reasonably be invoked as a motivation, but here there is a question of whether the teacher should be offering such altruism *on the pupils' behalf!*

It is *not* being suggested in this article that learners are necessarily disadvantaged by their involvement in the research process. Indeed, there are good reasons to suspect the opposite is often the case, as will be discussed. However, it *is* suggested that the learners' experiences of being research subjects are seldom discussed, and the question of whether they should be able to decline involvement does not usually seem to have been considered. Being involved in research may well be a good thing for our pupils and students, but perhaps this should *not be taken for granted (sic)* by the educational research community.

### *An Example from Practice*

My reading of the research literature about learners' ideas in science leads me to *suspect (sic)* that most data collection has not involved unreasonable demands on pupils. Much of the research involved activities that were not vastly different from usual school science fare, and *could be seen (sic)* as providing useful opportunities for assessment, and even learning. Indeed, it seems likely that many informants were not aware they were providing research information (which might itself be an ethical issue!) *It seems likely (sic)* that many informants benefited from being probed about their understanding of science.

Consider, as an example, some of the work of a well-known curriculum project. The Children's Learning in Science Project (CLiSP) undertook detailed explorations of classroom learning. One topic that was studied was that of the *particulate nature of matter* (i.e. the scientific model that everything is made up from tiny particles called atoms and molecules). A review of the literature, and an analysis of national assessment data, suggested that this was a topic where pupils often had difficulty understanding the scientific model (Brook *et al.*, 1984). The CLiSP team then set out to find more effective ways of teaching this topic in schools, something that is clearly a worthwhile aim of educational research. A research group was set up involving university researchers and local school teachers. The approach used by CLiSP *was considered* to comprise action research (e.g. Brook *et al.*, 1986, p. 3) as the project was planned to follow a research cycle, with the classroom teachers involved in the planning, execution and evaluation, and reporting of the research (cf. Carr & Kemmis, 1986; McNiff, 1992; Day, 1995).

The meaning of the term 'action' in the context of teaching and learning has recently been considered by Franks & Jewitt (2001), and there seems little doubt that the CLiSP work would comprise 'action' in terms of the motivation of, interest of, and meaning imbued by the collaborators involved. However, as McNiff (1992) has pointed out, there is not an agreed consensus on what is considered 'action research'. Some commentators see action research as primarily a practical approach that allows teachers (or others) to focus on their own professional practice to improve aspects identified as problematic (Hustler *et al.*, 1986); i.e. to answer the question, 'how do I improve my practice?' (Whitehead, 2000). From this perspective one would ask:

- what was the 'problem' being addressed by this group; and
- to what extent was this problem 'owned' by the group themselves?

It is well recognised by science teachers that the learning of many science concepts is problematic:

The literature ... makes it clear that motivated, able pupils, in appropriate learning environments, may often fail to learn effectively from keen, able, well-organised teachers. (Taber, 2001b, p. 159)

There is a vast canon of work related to this issue, and—particularly—to the alternative ideas that students commonly offer in place of accepted scientific explanations (Driver *et al.*, 1994). This, then, is clearly a valid and well-recognised professional problem for science teachers, and so from this simplistic perspective the CLiSP work would seem to qualify as action research.

However, some commentators view action research as action in social contexts designed to address *democratic* concerns (e.g. Kincheloe, 1991). Some research in science education deals with issues which clearly reflect such an agenda—for example, the *underrepresentation of girls* in elective physics classes (Taber, 1991)—but the ‘workaday’ business of teaching subject matter may not seem to be a strong candidate.

Yet, in a society which *requires* its young to be schooled, and lays down curriculum requirements that are mandatory in maintained schools, the knowledge that the teaching of a compulsory subject is often ineffective, and that topics are taught at stages where research shows the desired learning is unlikely, *is* surely a worthy target of action research.

One view of action research identifies educational ‘problems’ in terms of situations where the practitioner’s values are ‘negated in practice’ (Whitehead, 1989). Such a description can certainly be applied to the context of a teacher asking students to engage with curriculum content which experience and research show is unlikely to be understood as intended. Spending significant classroom time presenting material which is likely to confuse, or be misunderstood by, learners would negate most teachers’ professional values.

However, other commentators closely associate action research with the professional maturation of the teacher, and with the development of a self-critical attitude. From this perspective, action research is the means by which the teacher enacts the perpetual, ongoing internal dialogue of the reflective practitioner (Carr & Kemmis, 1986; Carr, 1989). Whilst there *have* been calls for science teachers to see teaching as a research-based activity, initial teacher education does not currently provide sufficient preparation to empower teachers to accept practitioner research as an integral part of professional practice (Taber, 1996, 2000b).

It is not clear to what extent the CLiSP work empowered the classroom practitioners involved in the research to ‘become critical’ (cf. Carr & Kemmis, 1986). Certainly, the project *aspired* to ‘find ways of communicating the often tacit craft knowledge of teaching’: it was felt that the (perceived) action research nature of the project would enable the teachers to make explicit their learning about the curriculum innovation (Driver & Oldham, 1986; p. 111). It should be noted, however, that the issue of how such research participants find their voice in materials co-written with academic researchers is not unproblematic (Zajano & Edelsberg, 1993).

For a year, this research group collected data on how pupils learnt about the focal topic in the partner schools (Wightman *et al.*, 1986). The group then devised new teaching approaches—informed by the data collected, and by a constructivist model of learning (Driver & Oldham, 1986). The new approach was then evaluated, with further considerable data collection (Johnston & Driver, 1991).

Johnston and Driver (1991; pp. 174–177) sought pupils' views after the topic was taught, and reported that the response was, on the whole, positive. The new teaching scheme was an outcome of much deliberation by experienced teachers, advised by university 'experts', and informed by research and scholarship. Even if the pupils had *not* benefited from the innovative approach, their involvement would have been justified as their teachers had every reason to believe they were improving practice.

However, one might take a different view when considering the experience of the teaching groups who were used to provide the 'baseline' data about existing teaching practice. It seems reasonable to ask whether their teaching may have been unfairly disrupted. Wightman and colleagues do not seem to have addressed this issue in their report.

I should reiterate at this point that my intention is not to suggest that research such as that of Wightman *et al.* has been harmful, but to highlight the *invisibility* of such ethical concerns in many research studies. Wightman probed the teachers about their teaching before and after classes, and spent time in lessons talking to pupils about their work. The interviews with teachers would have helped *them* conceptualise their lesson aims and think through their actions before teaching, and would have provided an extra vantage point during debriefings on what occurred (as well as ensuring that time was put aside to explicitly evaluate the lessons). During lessons, Wightman provided an additional 'expert'—effectively a second teacher—to discuss the work with the pupils. Clearly, her presence in the schools was *likely* to improve the learning experience of the pupils.

*Presumably*, the classroom teachers would have revoked Wightman's access to their classes if they had judged she was doing more harm than good. Indeed, teachers would *generally* act as 'gatekeepers', to protect their charges from any unreasonable approaches. However, it is still striking *how rarely this whole issue is mentioned* in research reports in the literature. There seems to be an assumption that pupils are 'fair game' for researchers' strange requests, providing those requests are moderate, and can be seen to be potentially useful *to the profession*.

### *The Particular Problem of the Practitioner–Researcher*

The metaphor of teachers acting as gatekeepers, controlling the access of researchers to their pupils, breaks down when the teacher and the researcher are one and the same. The teacher–researcher has automatic access to informants, and if data collection takes place during normal class sessions (and involves relatively innocuous activities) it would be quite possible for research to be undertaken without anyone else knowing. Again, this is not to suggest either that practitioners should *not* research their own classes, or that they would normally be secretive about doing so, but rather that there are ethical issues to be addressed.

Clearly, practitioner research may be of benefit to the practitioner, the researched, and the wider educational community. My point is that there is the *potential* for an abuse of trust, or at the very least the possibility of a teacher–researcher's poor judgements going unchallenged, unless such research is planned from a deliberately ethical standpoint. Being a teacher–researcher carries with it additional responsibilities to account for our actions to our students (Taber, 1994a).

*Issues of Methodological Purity and Compromise*

The decision to follow an ethical approach to research also necessarily limits the methodological options available. It is well accepted that there is a danger of any ‘researched’ group being atypical because of the extra attention shown to it. For this reason, apparent gains (e.g. in test scores) of ‘treatment’ groups may sometimes be *due to being the focus of research attention* rather than the specific innovation. This has been used to explain why initial gains sometimes disappear as a novel approach becomes standard practice, or is transferred to classrooms where the teachers do not share the instigator’s enthusiasm. In a similar way, ‘controls’ cannot be considered as typical if they are subject to unusual research attention.

In the CLiSP research discussed earlier, the classes that were observed being taught according to the pre-existing teaching schemes cannot be considered as ‘controls’ in the sense used in biology or psychology. Wightman’s study did not report ‘typical’ or ‘representative’ secondary school lessons on particle theory. The teachers involved were part of the ‘action research’ initiative, and were keen to improve practice through reflection and analysis of current practice. The report can only be seen as baseline data in the *particular context* of this specific curriculum development project. (It remains, of course, a valuable document in other ways: it is an example of a detailed study of classroom practice over sequences of lessons, and a rich source of data about pupil and teacher thinking.)

**A Research Project Guided by an ‘Ethical Imperative’**

The *Understanding Chemical Bonding* research project (Taber, 1997) investigated students’ developing understanding of a key concept in a science subject. In this case (cf. the CLiSP work discussed earlier), there is no ambiguity about the ownership of the research problem, as student learning about the chemical bonding concept had been identified as a professional concern by the practitioner. This research fits the notion of a practitioner attempting to respond to the question, ‘How do I improve my practice?’ (Whitehead, 2000). The research was undertaken in a further education college in England, with students following an A level (i.e. pre-university, college level) course.

The main research strategy used was to interview students in depth at several points in their course. In this way, it was possible to build case studies which could inform a general model of students’ developing understanding. A grounded theory approach was used (Taber, 1997, 2000c), incorporating a range of supplementary techniques, including Kelly’s construct repertory test (Fransella & Bannister, 1977; Taber, 1994b), to provide additional sources of data for the ‘case studies’. Further data were also collected from a wider population of learners who were not interviewed for the study. The grounded theory methodology inherently incorporates the notion of research cycles (Glaser & Strauss, 1967; Taber, 2000c) considered to be a key aspect of action research approaches (McNiff, 1992).

The main data collection took place over a period of four college years, with 15 students undergoing in-depth interviews. During the first phase, four informants were interviewed at three stages of their two-year course. In the second phase, a more flexible approach was applied, partly as a result of the ethical framework developed, as will be described below. Some students did not contribute interview data over as long a period as had been hoped. However, one of the students was interviewed for extended periods (up to two hours in some instances) on over 20 occasions. This informant provided rich

data, and his case study was the most valuable to the research (Taber & Watts, 1997; Taber, 2000d, 2001a).

### *The Ethical Imperative*

It was recognised from the beginning of the project that in-depth interviews would be time consuming, and could be quite stressful for some students. It was also recognised that if one of their lecturers asked them to give up time to be involved in the research, some students might feel pressured to agree. It was therefore thought that, as a practitioner–researcher, the lecturer owed a special duty to his students to safeguard their interests during the research (Taber, 1994a, 1997).

From the outset of the research study, it was considered important to *balance* the need to collect data in a systematic and reliable manner with the imperative to take an ethical stance. The following simple principles were established:

- to keep teaching colleagues informed;
- to ensure confidentiality of data;
- to ensure that all students involved in the case study work volunteered their time, *and felt their involvement was worthwhile*.

The first point was potentially sensitive as most A level science classes in the institution were shared between several teachers. This was at a time when college management was imposing a new scheme for staff appraisal and mooting internal observation and grading of teaching; and at a time when the wider experience within the further education sector was characterised by ‘mismanagement, low morale, sleaze and industrial action’ (Gleeson & Shain, 1999). It was therefore important that my colleagues had prior knowledge of the purpose and boundaries of my research so that they would not feel threatened by, or suspicious of, my actions.

Confidentiality is a standard safeguard in most research projects, and each of the interviewed students was given an alphabetical code and assumed name for use in all public documentation. For example, the first colearner to be interviewed was designated A, and referred to as Annie in a public report of her case (Taber, 1995a).

However it was the third point that was thought to be of *particular* significance in the research because of the dual roles involved: teacher–researcher and student informants. The researcher was also the students’ lecturer, and so to some extent an ‘authority figure’, who was involved in evaluating the students’ progress. It was considered that a researcher–informant relationship where power lies predominantly at the researcher’s pole, was *potentially* open to abuse:

‘A student–teacher relationship is never innocent, never free of ideological dimensions, and unequal power relations’. (Kincheloe, 1991, p. 197).

### **Labelling Students as Colearners**

The informants were clearly mature enough to make responsible decisions. They were students in post-compulsory education, having timetables with large gaps where they were assumed to be responsible for their own use of time. If the students had felt *obliged* to take part in the research, they could have donated their time whilst *feeling* that they were not benefiting from the interaction.

Although *it could* be argued (see later) that time spent discussing their academic work

with an ‘expert’ is likely to benefit a student, this would beg the question as to *who* is in a position to make such a decision. The *students* may have felt that they could have spent the time more usefully rewriting their notes or reading their textbook. The sessions could have just confused them (and indeed, sometimes did, as will be discussed). Indeed, they might have simply felt they would *rather* spend *their* time in some other way.

It was decided that the students who agreed to be interviewed should be given an explicit status as something more than ‘subjects’. Although labelling the students would not in itself safeguard their interests, it was considered to be a useful way of reinforcing the researcher’s conceptualisation of them as significant people who had a stake in the research process.

The term ‘co-researcher’ has been used in the literature to describe people involved in a research project. The importance of researchers negotiating expectations, procedures and responsibilities with *fellow professionals* is often commented upon (e.g. Frost, 1995). In contrast to the traditional approach (where the roles of the researcher and subject have been clearly differentiated), alternative models have been proposed where the ‘subject’ becomes co-researcher and the researcher becomes co-subject (e.g. Heron, 1981a, 1981b; Reason & Heron, 1995, 1999). The term co-researcher seems appropriate when applied, say, to teachers in classroom studies, such as the teachers involved in the CLiSP case studies referred to earlier, or, for example, to the ‘subjects’ of studies into teaching style and behaviour—such as ‘Sandra’, who contributed the ‘participating teacher’s foreword’ to a book based on the case studies of herself and a teaching colleague (Tobin *et al.*, 1990). Although my own partners in the research enterprise were valued as people and consulted about *their own roles* in the enquiry, they were not ‘contributing to the research propositions at all stages from the working hypothesis to the research conclusions’ (Heron, 1981a, p. 156), so the term ‘co-researcher’ was not considered appropriate. Rather, the informants were conceptualised as ‘colearners’.

Powney & Watts consider research interviews as ‘conversational encounters to a purpose’ (1987, p. vii). *My purpose* as researcher was to collect data for the research; but it could be asked ‘*what purpose do the colearners have, and why should they want to spend their time talking to the researcher?*’

Interview sessions could offer the students an opportunity to learn at two levels: to learn about how well they understood the work, and—as will be discussed—to learn about the curriculum content (i.e. chemistry) through the dialogue itself. Consequently, the research sessions had the potential to become mutual learning experiences. Although the partners had somewhat different learning goals, each was aware of what the other wished to learn from the experience. There was no deception, and the purposes were certainly not inconsistent. The relationship could be symbiotic: researcher and students could indeed be *colearners* in the process.

An important aspect of conceptualising the students as colearners was to respect their right *not* to be involved in the research (cf. Cooper, 1993; Limerick *et al.*, 1996). This included:

- (a) not assuming that colearners would wish to continue their involvement, but rather *inviting* them to each subsequent research session;
- (b) making it clear that colearners were free to leave the study at any time, and that they could decline to be involved on specific occasions;
- (c) making a point of asking colearners how they *felt* about each research session at its end.

The feedback provided by (c) was hardly an independent evaluation, but enabled the



researcher to monitor the colearners' experience of, and reactions to, the interview process. Although the colearners were asked verbally about their experience at the end of a session, it was decided to supplement this with a simple written questionnaire to demonstrate the importance attached their perceptions (see appendix 1).

One colearner, Tajinder, was particularly keen to be involved in the research, but found repeated completion of the feedback form to be a little tedious after a number of interviews. It was clearly inappropriate to continue to *collect feedback on his experiences* in a format that *he told me* he found tiresome! Tajinder agreed to keep a diary of his reflections on research sessions instead.

### Student Experiences of Being Colearners in the Research

Clearly labelling informants as *colearners* is an empty gesture if they did not learn anything from their involvement in the research. Indeed, the research would not have been faithful to the ethical framework unless the colearners *recognised* that they were benefiting from their contributions. The feedback collected (see appendix 2) suggested that the project had been successful in this regard (Taber, 1997; pp. 427–534), although (as will be discussed) the data are necessarily of limited reliability.

The feedback provided evidence about two main aspects of the research (see appendix 2):

- were the colearners comfortable in the interview situation; and
- did the colearners feel the interview had been a worthwhile use of their time?

The first point was clearly of significance in two ways. If the colearners found the interview situation uncomfortable, they were unlikely to be concentrating fully on the questions and their answers, and the research data would not reflect the full scope of their ideas. In addition to this *methodological* concern, there was the '*ethical imperative*' itself—the colearners should not be expected to undertake something they found unpleasant.

Although some types of research interview may fulfil a cathartic role for informants (Charmaz, 1995, p. 33; Reiss, 2000, p. 14), or be perceived by them primarily as a pleasant social experience (Reiss, 2000, p. 126), the interviews in the present study were unlikely to be seen in such a light. They were always going to have something of a flavour of the inquisition.

#### *How Comfortable Were Colearners during the Interviews?*

Providing a suitable physical environment to interview colearners was not a particular problem for the project, as college rooms could be booked for tutorial work when not needed for classes. However, temperature control in some rooms was problematic, and colearners reported feeling 'hot' on a small number of occasions. Some interviews suffered interruptions, usually from staff or students looking for other staff or students, but this did not seem to overly distract the colearners and was not mentioned in their feedback.

Noise from other rooms or from corridors was also sometimes a distraction, but this seemed to be noticed more by the interviewer concerned about making a 'clean' recording of the dialogue for later analysis. The tape recorder itself was generally not seen as an issue. One exception was an occasion when a succession of batteries failed and the colearner complained that 'it kept packing up!' All the colearners had given

permission for recording, and were asked a few general questions at the start of each session to test that the tape recorder was picking up their voice. As well as avoiding later disappointment for the interviewer, this is also a recognised tactic to put interviewees at ease. The interviewer's subjective impression was that the colearners soon ignored the recorder, and this is supported by the feedback. Although some colearners were 'a little self-conscious at first', they soon 'got used to it'. As one respondent reported, 'when I was thinking about the question, I tended to forget it [the recorder] was there'.

A more significant issue for the colearners was the experience of being subjected to a continuous stream of questions for an extended period. Although students are used to responding to a teacher's questions, there are a number of differences between the classroom context and the clinical interview (e.g. Edwards & Mercer, 1987):

- the answers to classroom questions are often cued (or 'signposted') as they are usually designed to teach as much as to test, whereas in an interview leading questions are avoided;
- classroom responses usually receive immediate evaluative feedback, whereas in an interview responses are accepted without evaluation;
- classroom responses, although public, are ephemeral, and part of an ongoing process of 'constructing common knowledge', whereas interview responses are documented and held on record;
- classroom questions are usually shared around, and shrugs of the shoulders may be enough to deflect the question to another student, whereas in an interview the questioning could be characterised as 'relentless';
- classroom question sessions usually last a few minutes at a time, whereas the research interviews were often of the order of an hour or more.

The interviews were designed to probe thinking in depth, and this included looking at the way ideas were justified (Watts & Taber, 1996), and whether several alternative conceptions would be used by the same colearner (Taber, 2000d). By necessity, then, the experience would be something of an interrogation. This is reflected in the words the colearners selected as describing their experience. 'Challenged' was the most common selection, but 'questioned', 'tested', 'explored', 'examined' and 'probed' were also popular (see appendix 2).

Most of the interview sessions lasted over 30 minutes, many over an hour, and some over two hours. Clearly, most students are not used to being questioned about their knowledge in depth for such an extended period, and this was one aspect where feedback was sought. It was reassuring that only four (of the 46) sessions were experienced as being 'long' by the colearners themselves. There were a couple of comments that the time 'went quickly', and, as one colearner explained, 'I didn't really take note of the time as I was busy in the question'.

All of the respondents felt they were given sufficient opportunity to explain their ideas (comments included 'ample', 'plenty' and 'yes—definitely!') It was also reassuring that *most* of the feedback about the style of questioning was positive. Being 'given sufficient time to answer questions' was appreciated: 'I felt that the time to answer the question was good. I didn't feel under pressure to answer straight away'.

There was some recognition of the nature of the interviewer's task, with comments that the questions were 'all connected', 'well structured', and 'arranged systematically'. The relentless nature of some of the questioning did not go unnoticed. One colearner noted how one question would 'go deep into what I said to a previous question', and it was recognised that the style 'made sure I wasn't guessing'.

However, this also provoked some critical comments, such as: 'It was clear but repetitive which makes it seem as though my answers were wrong'. Usually, a teacher only repeats a question if the answer offered is not that being sought. Yet, in a research setting the use of repeated questions (at different points in the interview, in different contexts, with different examples, using varied wording) is part of the technique of exploring the consistency and conviction of learners' thinking (Taber, 1995a). As one colearner explained, the style could be 'a little confusing at times'. Indeed, the word 'confused' was selected from the word menu on 15 occasions; that is, after almost a third of the sessions. This is clearly a potential indicator of discomfort. However, it could *also* signify that the interviews had made colearners aware of limitations in their understanding, which could indicate a useful session (see below).

A number of words that were selected as describing the session (such as 'panicky' and 'embarrassed') suggested that some colearners were uncomfortable with the questioning at times, but were each chosen on three occasions or less. As might be expected, some colearners were more self-confident than others. Some seemed very *robust* 'under interrogation', where others were more *delicate*. Part of the interviewing task was to find how far the colearners would justify and defend their statements, but probing questioning that might be considered challenging and thought-provoking by one individual could seem hostile to another. This is just one area where the interviewer needs to exercise fine judgement *in situ*, and—perhaps inevitably—there were occasions when the style of questioning was not well enough tuned to the colearner's sensitivities.

### *Learning about Their Current State of Knowledge*

The main benefit that students might expect from being involved in a research study such as the *Understanding Chemical Bonding* project would be the opportunity to test out their knowledge. Indeed, 'questioned', 'tested' and 'examined' were words commonly selected from the word menu to describe their experiences. More significantly, in virtually all (96%) of the sessions the colearners felt they learnt something about how well they understood their work.

Some of the comments merely referred to realising they did not know the work well enough, e.g. 'I need to know more', and 'sometimes I felt I didn't really know what I was talking about'. However, other comments suggested more specific meta-learning had taken place. For example, a number of responses referred to the realisation that their knowledge lacked depth: 'Yes, it seems that I know the facts but don't know why they are facts' and 'Yes, I know things happen but I don't know why'. One colearner found an inability to apply ideas ('lacking ability to apply to simple situations'), and the manifold nature of the scientific models used in the subject (Taber, 1995b) was recognised by another colearner (Taber, 2000d): 'I was reminded there is more than one way of looking at a situation'. Some responses suggested that the sessions had helped the colearners *identify* specific areas of weakness ('where I was going wrong'): 'Yes, now I know where I need to revise more thoroughly' and 'Yes, found out what I was not too sure about'. At least one colearner recognised the metacognitive nature of this learning: 'Yes. I think that I learnt, a little, about how I think'.

### *Learning about the Subject Matter*

As the interviews were designed to *explore* colearners' subject knowledge and related thinking, they were not designed to be teaching sessions. The familiar term 'tutorial' was

used when discussing the sessions, but all colearners were clearly briefed about their purpose (see appendix 3). Although explicit teaching within the interviews was avoided, the labels ‘educated’ and ‘taught’ were selected from the word menu to describe the sessions on 14 occasions each. Indeed, colearners felt they had learnt something about science in the majority (83%) of interview sessions, and this needs to be explained.

Colearners’ comments may be informative here. Although some of these merely specified which particular topics were understood better (‘forces and orbitals’, ‘compounds, elements, atoms and molecules’), other responses were more general. One colearner noted that the interview ‘made me think more about certain issues’, and there were references to how being interviewed ‘made me develop my ideas further’. There was a comment about how the questioning encouraged colearners to apply their knowledge: ‘yes, I did put to use some basic facts, and used them to work out harder examples’. One colearner acknowledged that the experience of being interviewed revealed knowledge that had been tacit: ‘Yes, I learnt things that I know and those that I don’t. I realised that I know some things that I didn’t know I knew’.

Perhaps the most reassuring aspect of the feedback was that there was unanimous agreement (100%) in the feedback that the colearners felt that sessions were a worthwhile use of their time. Some responses amplified this either by reinforcing the view that they were more aware of their own state of understanding: ‘I need to know a little more about Chemistry’; ‘I now know that I need to read up on bonding’; ‘I know what I need to revise more on’; or that they found the experience itself helped them learn about the subject: ‘It helped me think more deeply about first principles’; ‘It developed the ideas’.

## Discussion

There are a number of issues that arise from this particular research project which may be seen to have wider implications for other studies that call heavily on learner input. In particular, it is suggested that the desire to act ethically may impinge upon the ability to follow strict procedural protocols.

### *Reliability of Feedback Data*

The feedback from the colearners interviewed for the project was reassuring, and provided *internal* evidence that the students found the experience of contributing to the research as largely positive. However, the reliability of the data on which this conclusion is drawn is clearly open to question.

The students were interviewed by a researcher, who was also their lecturer, and then asked—by the same individual—to record their perceptions of the session. The potential conflict of interest between my researcher and teacher roles is not avoided by adding the third ‘hat’ of evaluator. The lack of any independent perspective is a common difficulty in many practitioner studies, and is one of the reasons why much action research is often perceived as necessarily being of limited generalisability (Elliott, 1991, p. 65).

However, the purpose of this paper is not to *report an evaluation* of the colearner experience in the *Understanding Chemical Bonding* project *per se*, but rather, to *offer an example* of the kind of simple steps that the teacher–researcher can take to make sure that the feelings of informants are monitored and ‘kept in view’ during data collection.

*Methodological Purity versus the Ethical Imperative*

Just as the limitations of a non-funded single-researcher project mitigate against an independent evaluation, the very stance of following an ethical framework restricts the procedural options available. In particular, there are a number of 'degrees of freedom' that are methodologically desirable, but may be lost through taking an overtly ethical approach to one's research. For example, in the present study, the number and timing of interviews was not optimum, with some colearners being interviewed on more occasions, and over a longer period of time, than others. This was partly because some of the colearners declined the invitation to be interviewed at the end of their course. Although they had previously judged the sessions worthwhile, they did not want to be interviewed just before their examinations. Their stated reason was the pressure of revision taking up their time. (I suspected that in at least one case the thought of looming examinations was causing some stress, and an interview may have added to this.) A counter-offer, to be interviewed once the examinations were completed, reinforced the notion that the colearners valued the interview sessions, but was declined by the researcher. It was felt this would not be in these colearners' best interests, as it would be 'too late' for anything they learnt about either chemistry or their understanding of science to help them in their revision, and could have been a source of worry—had it led them to doubt the answers they had given in the examination were correct. Other (perhaps less stressed and/or more self-confident) colearners were more than happy to contribute during their final revision programme. In-depth studies of learning focus on the specifics of individual learners, and must respect their individual characteristics and preferences.

A more difficult methodological—ethical tension concerned what the researcher should do when the interviews revealed significant misunderstandings (Taber, 1994a). A somewhat naive perspective might suggest that the interviews were undertaken in my research role, which was distinct from my teaching role; and that if I was to observe the course of the students' developing understanding I should *not* give tuition during the research sessions. Yet, clearly, this position is untenable from both methodological and ethical perspectives. The interviews were additional learning opportunities, even if utmost care was taken not to teach (see below), and so the research would change the course of conceptual development of the students. In any case, the colearners were volunteers, in one institution, being taught by someone with a particular interest in exploring the teaching and learning of the topic: the rate and course of their conceptual development could not be considered to be representative of the wider population of A level chemistry students.

More seriously, it would be unethical and unprofessional that a teacher should uncover serious defects in his or her students' learning, and make no effort to take remedial action. A compromise position was taken that the sessions would comprise of interviews, which would be research acts without any *explicit* teaching, followed by a debriefing where appropriate tuition would be offered. In this way, each interview was kept as a 'closed' research act, but the follow-up feedback might well effect progression between interviews. This was considered acceptable as the research 'product' was understood to be descriptions of *possible* 'conceptual trajectories' (Taber, 1997, pp. 379–383, 1999), and not a normative record of typical student progress.

Other compromises were entered into, such as the negotiation (referred to earlier) of a different form of feedback for one colearner, Tajinder, who made himself available for a large number of research sessions. Tajinder agreed to keep a diary of his feelings about research sessions, instead of continuing to use of the feedback sheets—a decision that

resulted in a particularly rich source of data about his experience as a colearner (including the quotation used in the title for this article). Tajinder found the interview sessions very helpful, but was less positive about Kelly's repertory test technique. Tajinder did provide data in this way on a number of occasions, but less often than would have been requested had he perceived the activity as more worthwhile. In particular, Tajinder found these 'picture card' sessions frustrating as the technique required him to make discriminations, but not to talk through his reasoning. Through negotiation, it was found that the two techniques could be combined: Tajinder was happy to sort stimuli cards according to his personal constructs provided he was allowed to explain in detail why he make the decisions—something that was not normally part of the procedure (which is designed to elicit tacit constructs). He found this 'more useful than normal picture cards, learned a lot'. Tajinder recognised that it was the *talking through* of ideas that helped *him* as a learner.

### *Being Interviewed as a Learning Experience*

Even though the interviewing was designed to elicit the colearners' ideas rather than to teach, most interview sessions were *perceived* as involving learning of subject matter. Yet, this should not be surprising, as an in-depth research interview exploring understanding (rather than one exploring opinions, for example), will resemble a platonic dialogue, i.e. the Socratic method of teaching (Egan, 1984).

Views of learning that derive from Vygotsky's work, put great emphasis on the notion of scaffolding (e.g. Scott, 1998). Vygotsky ([1934] 1986) wrote of the zone of proximal development (ZPD), which described the interpersonal 'space' where a learner can move beyond what they are capable of doing alone, by being provided with an appropriate support structure. He believed that working in the ZPD helped the learner to organise their own learning until they were able to achieve the same success unaided.

The type of question sequences used in research interviews might well be seen as a very effective form of scaffolding, leading the interviewee to explore connections between ideas which they would *not* have done spontaneously. For example, a learner may well hold in cognitive structure all the necessary links to construct a logical argument to explain a higher level phenomenon in terms of the fundamental concepts of the subject. Yet, the learner may not spontaneously construct the logical chain of propositions necessary for forming a full explanation (Taber & Watts, 2000). The interviewer can provide an appropriate *sequence* of questions, to enable the learner to use their existing conceptual resources to construct the full argument. This explains colearners' comments such as, 'I realised that I know some things that I didn't know I knew'. A particularly striking example of this was when a colearner in the research project, Noor, produced an explanation for why iodine molecules should stick together. Although she had not at that time been taught about the phenomenon (known as *van der Waals' forces*), and clearly did not know the name of the effect, she was able to construct an explanation in terms of 'first principles'. She had no recollection of having been told, or read, about the accepted explanation, but apparently 'just thought it out' when questioned (Taber, 1997, p. 520).

### *The Value of Being Confused?*

One of the most enigmatic aspects of the feedback was the extent to which colearners reported being confused by the interview questions. I see this as particularly problematic

because it is not clear to what extent this is something that *should* be avoided, and therefore it is not clear how future interviewing practice should be altered. Confusion may be an unpleasant, and possibly demotivating experience for students. Not only might colearners have been deterred from contributing to the research, but—potentially—confusion could have dampened their enthusiasm for the subject and their studies. Yet, conversely, a state of confusion may be an indicator of readiness for conceptual growth. From a Piagetian viewpoint, all learning involves assimilation and accommodation, but the latter will only occur when a disequilibrium is recognised (Kitchener, 1992; Bliss, 1995). Students need to experience 'cognitive dissonance' before they can accommodate new knowledge.

There is a significant literature on the nature of conceptual learning in science (Taber, 2001a), and it is not possible to make more than a few brief comments here. Much learning may be considered to take place through a process of accretion, or 'conceptual capture', with existing conceptual frameworks being augmented as new knowledge is fitted in. (In Piagetian terms, the accommodation step does not require drastic restructuring.) However, there is much evidence that not all learning can be modelled this way: that at critical points major reorganisation of existing knowledge has to occur for the student to make significant further progress in a topic. The best way of modelling these processes is unclear, but there is evidence that one key aspect is that learners may have to develop 'manifold conceptions', i.e. multiple alternative conceptual frameworks for the topic (Taber, 2000d). These are analogous to alternative hypotheses in a scientific puzzle, or different suspects in a criminal investigation.

The learner needs to explore the potential explanatory power of the different conceptions, and find which provides the basis for the most coherent view of a topic (Thagard, 1992). Much of this process seems to be at a subconscious level, but conscious examination of the learners' ideas (such as takes place in a research interview) may act as important *preparation*. The chemist, Pasteur, is well known for the observation that, in science, chance favours the prepared mind (Mackay, 1991), and it has been claimed that more generally, 'successful scientists have emphasised the importance of preparedness of mind ... worked for and paid for by a great deal of exertion and reflection' (Medawar, 1986, p. 50). Nobel laureate geneticist, Barbara McClintock, was very aware of how she relied on such subconscious processes to find the right way of interpreting data (Keller, 1983). However, she also admitted being driven to tears whilst waiting for subconscious thinking processes to bring her the insight she needed to see her way through a scientific problem.

Although none of the colearners in the present study was reduced to tears by the questioning, cognitive conflict can be very unsettling. Tajinder's diary provided evidence of the struggle, e.g.: 'Most frustrating. I was too unsure on many things, even things that I had sorted out last year like ionisation energies'. However, despite his diary recording how he found many of the sessions 'difficult' and 'frustrating', it also records how he recognised the value of being made to think deeply about the subject matter: 'I find these sessions quite intense, very hard work, they rack my brains and I find out just how well I really do know my work'. Tajinder had reached a level of metacognitive awareness where he recognised that the discomfort of some confusion and frustration was an indicator of his thinking being extended to new levels:

Sometimes I wonder whether I am learning anything during the tutorial but I realise I learn more in the tutorial because I am made to think *how* well I think

I understand the work. Therefore if a problem is set to me I can hopefully think my way around it and not just get stuck.

In the final analysis, he judged his involvement in the research as worthwhile: 'The tutorials are becoming more intense and longer but it's all worth it in the end'.

### Conclusions: Lessons for Future Research

This article discusses aspects of students' experiences of being informants in a specific research study into the learning of curriculum material. Although the *issues* raised here are of wider significance, the *particular* reported responses to being involved in the study cannot be widely generalised. The colearners in the study were A level students in a college, not under the same protection of teachers that would be expected of schoolchildren, but neither considered to have reached the maturity and independence of, say, undergraduates. The concerns which stimulated the need for emphasising an ethical framework would not be so severe when students are asked to provide research data in less intense and time-consuming ways. The potential for abuse of the students' goodwill was more significant because the researcher was also the classroom practitioner.

However, this discussion of learners' experience of being research informants is considered to offer a number of lessons that might be of widespread significance. A first observation is that establishing a simple ethical framework may be a significant act (cf. Frost, 1995). Whitehead's (1989) notion of the practitioner undertaking research in order to overcome the negation of professional values is relevant here. A key recommendation from the work considered here is that the teacher–researcher needs to *make explicit* her professional values in the new role of researcher *before* commencing her inquiry. This is a necessary safeguard, to ensure that research acts intended to address the negation of the practitioner–researcher's professional values *as teacher*, do not inadvertently lead to the negation of the practitioner's professional values *as classroom researcher*.

It may seem that a simple principle such as 'to ensure that all students involved in the case study work volunteered their time, and felt their involvement was worthwhile' (Taber, 1997; p. 137) could easily be taken for granted. In the present study it was found that making such a principle *explicit* had particular consequences. For one thing, it implied a need to continuously reiterate that each request for involvement was an invitation that could be refused without subsequent repercussions. This in turn had methodological consequences for the research.

A research design that requires informants to provide input on a minimum number of occasions, or at specific times, is vulnerable if the informants' rights to withdraw are emphasised. In the present study, this could have been a potential problem, but luckily, the number of colearners volunteering provided redundancy. The research would have been significantly curtailed had *all* the colearners wanted to withdraw from the study at an early stage.

A second consequence of the ethical stance taken is that it places an onus on the researcher(s) to *check* that the informants are indeed contributing *because* they find the experience worthwhile. Initially, in the present study, colearners were simply asked orally how they felt about an interview session at the end. However, this was supplemented by a simple written questionnaire which was easy for colearners to complete, and readily analysed. Such a procedure allows the researcher to collect data that may be seen (internally) as objective, within the limitations of a small-scale practitioner study where independent evaluation is not available.



The decision to collect such data *itself* has consequences: one has to consider how to respond when informants feel 'panicky' or 'embarrassed', or more commonly in the present study, 'confused'. The researcher may use such information to fine tune interview style to the characteristics of individual informants. It *may* be more productive in the long term to be less probing, if this will help the informant remain more at ease, and more likely to return for later sessions. In such a case, the ethical and methodological interests may both *ultimately* be served by increased sensitivity to the informants' feelings.

Another significant finding in the present study was that colearners often claimed that being interviewed in depth about their work *not only* helped them learn about the level of their current knowledge, but also helped them to learn the curriculum material itself. Although such learning is to be expected from an educational perspective, it is interesting that these students often showed the metacognitive awareness to recognise how they were able to talk themselves into greater understanding. In Tajinder's case in particular, it was clear that he accepted a 'no pain, no gain' perspective on his involvement: recognising that the frustration of cognitive dissonance meant he was pushing his knowledge to its limits, and then (through the new insights that result) beyond. He seemed to develop an instinctive appreciation of the importance of working within (what followers of Vygotsky would label) his zone of proximal development.

The value to the learner of developing metacognition is well recognised (White & Mitchell, 1994). Learners who are prepared to *test* their knowledge and understanding, to destruction if necessary, are more likely to move their learning on. The college students who were colearners in the present study sometimes seemed to recognise the value of being 'cognitively uncomfortable' in the interview situation as symptomatic of the learning process. However, research into secondary pupils' ideas about the nature of scientific knowledge might be interpreted as suggesting that it is unlikely that many school pupils would have the sophistication to appreciate this (Driver *et al.*, 1996).

One final lesson from this present study, then, is a suggestion that part of the interviewee's briefing in such research could be to have explained a little about this aspect of the process. In this article, it is accepted that research of this type is not able to follow 'normal' conceptual development (if there be such a thing), as the probing will effect, and likely accelerate, normal learning. I have also emphasised an 'ethical imperative', that the learners should benefit, and feel they benefit, from their involvement. Interviewees could be prepared to expect and accept some feelings of confusion and frustration, and to try to welcome these sensations as positive indications of an effective exploration of their thinking. This may seem fanciful, as many learners are nervous of being uncertain, but it would help the interviewer delve deeply into the learner's thinking. It would also help the learner not only to take on board the learning opportunities inherent in the research sessions, but also to develop an attitude that would be beneficial for subsequent study episodes. In this way, the colearners (researcher and student) can both learn even more from their collaboration.

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## Appendix 1. Standard Interview Feedback Format

Colearners interviewed during the period June 1992 to May 1994 were asked to complete a feedback sheet at the end of interviews. Feedback regarding 46 interviews was collected in this form over the period, involving 12 different colearners. The feedback had two parts. In the first, colearners were asked to select from a long list of 60 words, those that described their feelings during the interviews:

- angry • appreciated • auditioned • bored • calm • capable • challenged • clever • cold • comfortable • confused • devalued • developed • educated • embarrassed • enlightened • examined • explored • fascinated • frustrated • grilled • helped • hindered • hot • hungry • informed • insulted • intelligent • interested • interrogated • intimidated • lectured • nervous • panicky • probed • put-down • questioned • relaxed • ridiculed • scared • scrutinised • shown-up • sleepy • smug • stressed • stretched • stupid • talked-down-to • taught • tense • tested • thick • thirsty • tired • tortured • uncomfortable • upset • valued • weary • worried •

The colearners were also asked to add any other words that expressed their experience of the sessions. The second part of the feedback, asked specific questions to which the colearners were invited to use one-word or longer responses as they saw fit:

1. Did you find the tape recorder off-putting in any way?
2. Did you feel you learnt anything about science?
3. Did you feel you learnt anything about how well you understand your work?
4. Did you feel you were given the opportunity to explain your ideas during the tutorial?
5. Did you feel this tutorial was a worthwhile use of your time?
6. How did you feel about the duration of the tutorial?
7. How did you feel about the style of questioning?

Any other comments you wish to make?

## Appendix 2. Analysis of Student Feedback

The feedback had two parts. In the first, colearners were asked to select from a long list of 60 words, those that described their feelings during the interviews. The words were presented in alphabetical order, and were intended to include feelings that I considered both appropriate and undesirable (either from methodological or ethical considerations). The words that were selected, in order of popularity, were:

- 38 selections: challenged
- 23 selections: helped, questioned
- 22 selections: developed, interested, tested
- 21 selections: explored
- 18 selections: examined
- 15 selections: confused
- 14 selections: educated, taught
- 9 selections: informed, probed
- 7 selections: appreciated
- 5 selections: clever, comfortable, hot, intelligent, relaxed
- 4 selections: calm, nervous, stretched
- 3 selections: enlightened, frustrated, hungry, panicky, thirsty, valued
- 2 selections: capable, embarrassed, fascinated, shown-up, sleepy, thick, weary, worried
- 1 selection: grilled, interrogated, lectured, talk-down-to, tense, tired

Words that were not selected at all were: angry, auditioned, bored, cold, devalued, hindered, insulted, put-down, ridiculed, scared, scrutinised, smug, stressed, stupid, tortured, uncomfortable, upset. Although the colearners were invited to add any other words that described the experience, no new words were added. One colearner responded, 'a little confused at times', perhaps because she did not feel confused enough—or enough of the time—to select the word from the list. The second part of the feedback asked specific questions, to which the colearners were invited to give one-word or longer responses as they saw fit.

1. Did you find the tape recorder off-putting in any way? (see Table AI for response).

Table AI.

Response classification	<i>n</i>	%
Yes	2	4
Slightly/a little	2	4
No	41	89
No response	1	2
Total	46	(99)

2. Did you feel you learnt anything about science?

Some colearners replied 'yes' to the question, but went on to make supplementary comments which suggested they were referring to learning about their own knowledge (the subject of the next question) rather than about the subject. These have been categorised as 'yes—but metacognitive'. One colearner responded, 'Only what I [thought] I already knew'. This has been classed as providing reinforcement. Responses were classified as shown in Table AII.

Table AII.

Response classification	<i>n</i>	%
Yes	35	76
Yes—but metacognitive	4	9
Some/little	3	7
Provided reinforcement	1	2
No	3	7
Total	46	(101)

3. Did you feel you learnt anything about how well you understand your work? Responses were classified as shown in Table AIII.

Table AIII.

Response classification	<i>n</i>	%
Yes	44	96
No	1	2
No response	1	2
Total	46	(100)

4. Did you feel you were given the opportunity to explain your ideas during the tutorial? Responses were classified as shown in Table AIV.

Table AIV.

Response classification	<i>n</i>	%
Yes	45	98
No	0	0
No response	1	0
Total	46	(100)

5. Did you feel this tutorial was a worthwhile use of your time? Responses were classified as shown in Table AV.

Table AV.

Response classification	<i>n</i>	%
Yes	46	100
No	0	0
Total	46	(100)

6. How did you feel about the duration of the tutorial? The responses were classed as shown in Table AVI.

Table AVI.

Response classification	<i>n</i>	%
Okay/good/did not notice	37	80
Long	4	9
Not very long	1	2
Irrelevant response	3	7
No response	1	2
Total	46	(100)

7. How did you feel about the style of questioning? This question brought the most varied responses. Some responses were categorised under more than one class of response (see Table AVII).

Table AVII.

Response classification	<i>n</i>	%
Good/very good/liked	17	37
Okay/fine/all right	8	17
Clever/intelligent	5	11
Clear	4	9
Makes you think/challenging	3	7
Systematic/well structured/connected	3	7
Confusing	3	7
Persistent/goes deep/makes sure not guessing	3	7
Gives time to answer	2	4
Implies answers are wrong	2	4
Variable	2	4
Repetitive	1	2
Off-putting	1	2

Any other comments you wish to make? The responses were classified as shown in Table AVIII.

Response classification	<i>n</i>
Session helpful or very helpful	8
Other comments	0
Total	8

### Appendix 3. Introductory Script

The colearners were told, at the beginning of their first interview:

I am conducting some research into how students learn about chemistry during their A level course. I am going to show you some diagrams, and ask you some questions about them. I want to explore your ideas and your understanding so I will often follow up your answers with more questions, and I may challenge you to try and explain your ideas. In order to probe your ideas I will not be judging your answers as right or wrong but will try and explore what you really think. So I may seem to go along with answers that I don't think are quite correct, and I could seem to disagree with others, even if I really agree with what you have said.