1.1 IMPROVING LEARNING IN SCHOOLS - AN INSERVICE PROBLEM

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In March 1976 at exactly the same time as receiving the letter terminating my employment in the next section, I produced a research report on the project I was evaluating. The report described my research with a group of six teachers from three schools who worked together for a year to improve the quality of learning for 11-14 year olds in mixed ability science groups. In 1977 The British Journal of In-service education published an article of mine on 'Improving Learning in Schools - An In-service problem'. I argued that improvements in pupils' learning occurred through the creative power of individual teachers to transfrom their situation. I showed the teachers engaging in action learning where they isolated their own problems, produced their actions plans, acted, evaluated the quality and effectiveness of their practice and modified their problems, ideas and actions in the light of their evaluations. Part of my work was to gather the evidence which the teachers could use to evaluate their practices.

The process of evaluation was based on the assumption above that teachers could evaluate the contradictions between their intentions and practice when presented with objective evidence. I visited schools once a fortnight to observe the classrooms and to video tape and interview the pupils and teachers. The video tapes were viewed immediately after the lessons or at the next meeting of the working group. Transcripts of the interviews on the teachers' intentions and pupils' interpretations were given back to the teachers within a fortnight. When I read the conversations below I am conscious of my commitment to help teachers to enhance their professionalism and to improve the quality of their pupils' learning through research. In retrospect I wonder what an appropriate judgement would now be on the contribution of Professors, Ray Thomas, Len Broadbent, Stephen Cotgrove, Bunny Dowdeswell and Ken Austwick, to the recommendation to terminate my employment on the grounds given below. I cannot help but contrast the care of the teachers in their educative relationships with their pupils with my experiences as a probationer lecturer.

The first extract from the paper illustrates how the process of self-evaluation of oneself as a living contradiction provided a basis for improvement for Roger Barrow, a science teacher in Wootton Bassett School. The second extract shows enquiry learning in action with Paul Hunt at teacher at Dorcan School, Swindon.

Roger: I was concerned with the fact that most of my teaching was being pitched in the middle of the ability range and I wasn't really catering for individuals. I also had the problem of designing courses for teachers who are not specialists in particular fields. In the first instance I feel we must produce good work schemes which

increase the teachers and pupils' confidence. When we have built up our understanding of this situation, we can then move on to the second phase of responding to the learners' questions.

Jack: You see the vital thing is getting the kids to ask questions?

Roger: I'm not sure everybody agrees. I feel that so much of what has happened in Science Teaching has been a dull simulation, jumping through hoops at the appropriate moment at the command of the teacher or the examiner. I've come to realise over a period of time that we were chaining any creativeness and inventiveness in science. I know someone has to work through all the permutations and combinations but I think we have got to open out the possibilities for originality. I think so much of what we do in science is forced on us by exam syllabuses and

kills all expression of opinion or development of ideas.

I interviewed Roger's pupils and feed back data of the kind from a pupil, Paul;

Jack: What kind of things did you do yourself?

Paul: Well, we got all the apparatus and put it up ourselves and poured in the mixtures ourselves and we did, Mr Barrow just helped us a little bit, if we were stuck.

Jack: Really, yes. Did you ask any questions about the way you were doing this?

Paul: No.

Jack: You didn't. You just did it?

Paul: Yes.

Jack: But where did you get your ideas from then, if it didn't come from you?

Paul: Well, Mr Barrow had a little talk with us in the beginning and then he got all our stuff out for us and we put it up and we went to go and get it and then we did our experiments.

Jack: I see. As you were doing the experiments did you have any ideas of your own that you wanted to test?

Paul: No.

Jack: I see. And if you've got questions of your own, like when I put that in front of you, you said, you know, I've tried to separate it, is that because when you're given substances like this, you were told how to separate it or not?

Paul: Mr. Barrow helped us a little bit.

Jack: Yes.

Paul: And he told us if we were doing things wrong. If we did we started again.

Jack: Yes. The thing I want to try to find out is do you have any ideas of your own that you'd really like to think about and test out.

Paul: No, not really.

Jack: You don't?

Paul: No.

Jack: What do think scientists do? Do you think all their problems are always given to them or do you think that some scientists really try to think out ideas of their own.

Paul: Yes.

Jack: Which one do you think?

Paul: That they try to think it out themselves. Trying to make things that can help people, medicines or something.

Roger interviewed his own pupils.

Roger: You remember that, and you had to try to save water yourself didn't you? Yes?
Tracey: Yes.
Roger: Well, what did you do it stop to evaporating away?
Tracey: We put a dish on the top of a beaker with water in it and put ice in it.
Roger: Oh, yes. Why did you get that idea?
Tracey: I'm not quite sure.
Roger: You're not quite sure. Did you see other people
Tracey: No
Roger: Or did you work it out for yourself?
Tracey: No.
Roger: How did you get it then? You just don't remember.
Tracey: You told me.
Roger: I told you! Deary me. That's the second person who's said I told them, been splitting obviously. What was the ice doing then?

This process of evaluation has highlighted to Roger Barrow the gap between his intentions and his actual classroom practice. Roger modifies his approach with the following result.

Roger: Now what I want to do is just ask you one or two questions about what we've been doing in science this term. First of all what did you do, what were you expecting when you discovered that you'd got science on your timetable? Did you have any idea what you would do?
Boy: No, not much. Well, some that we did in our other school was very different.
Roger: I see, what was different about it?
Boy: Well, it was more set, you know, they did more for you instead of now you have to do more for yourself.
Roger: You feel you've had to do more for yourself?
Boy: Yes.
Roger: Have you enjoyed doing more for yourself?
Boy: Yes. It's the independence of it . . .
Roger: The independence of it you enjoy?
Boy: Yes. Discovering the actual thing with nobody telling you what's going to happen.
Roger: You really enjoyed that did you?
Boy: Yes, that's what I like about it.
Roger: You like that? Oh splendid.

The following evidence clearly demonstrates how enquiry learning has actually taken place within a classroom where the children were working on a series of experiments highly structured by worksheets. The majority of the class could continue their activities with a minimum of supervision from the teacher. This allowed the teacher Paul Hunt at Dorcan School the opportunity of fulfilling the role of "consultant, advisor or tutor". Paul taped his conversations with his pupils and in the following extracts he describes how the process of self-evaluation occured in dialogue between himself and a small group of learners.

Four second year girls were measuring the acidity or alkalinity of oxides by adding drops of indicator (a green liquid) into a mixture of the powder and water. One pair obtained an orangy-red liquid indicating an acid and the other pair obtained a blue liquid indicating an alkali. They came to me, formulated their problem, "we got different colours" and received permission to continue work to solve their problem.

By the end of a double lesson they succeeded, after three failures involving highly creative work, to obtain the same blue colour indicating that the oxide is alkaline.

Teacher: *What was important about what you were doing?*
Tracey: *It's just that, well, when we got different answers, we couldn't see why we got different answers and so we wanted to get them so that they were the same.*
Judith: *We were excited . . . It would have been better if we'd had longer.*
Teacher: *I mean, why was what you did so valuable? What was its value to you?*
Judith: *I suppose it was our own little discovery.*
Denise: *We achieved something . . . we don't normally get so interested in lessons, but this time we just got interested because we wanted to find out the answer to it.*
Teacher: *Was it the answer, the so-called answer that was important or was it something else?*
Tracey: *Well, we was very pleased when we got the right answer, but I don't know . . . well, every other experiment that I do is normally a complete flop and, well, this one seemed to be going quite well and so I got really interested in it.*

Teacher: *But for someone coming into the room, your experiment would have seemed more of a flop than the normal. Do you understand that? They would have seen one of you with a blue colour and one of you with an orange colour and said 'well something has gone wrong . . . do it again . . . it's not right'. In fact it would have seemed a complete flop.*
Tracey: *Well, it came out of a . . . well, it wasn't exactly a flop, but it was more or less, but the reason was . . . it started off with a flop and we got it to a good experiment. Well, I thought it was.*
Teacher: *What do you feel you created in this room?*
Sandra: *Noise!!!*
Judith*: I suppose, you know, the atmosphere was, we were just more excited after it didn't work twice, so, you know, we just kinda, well when the teacher come into the*

room and saw it was a flop, I don't think I could have seen it as a flop, because it was, you know, just a discovery which you wanted to take further. So if they saw it as a flop then I can't see why.

And subsequently:-

Judith: *Well, I suppose really it was that we were doing an experiment off our own bats, and it working was the most important thing because it was our achievement and not prompted by the teacher and it wasn't what everybody else was doing, so it was different and so we enjoyed it more than we would have before.*
Teacher: *Are there any questions that you want to ask me?*
Judith: *Well, in the next lesson, can we carry on?*
Sandra: *Yes, 'cos we didn't find out why. All we did was we finished the experiment, you know, just got the result the same, but we didn't find out why!!!*
Teacher: *Right! Yes. That's what you want to do. That would be good, you know, to find out what it was that made the oxide go, on the one hand blue and on the other hand red.*

The dialogue shows how the evaluation process has encouraged the formulation of a new question; a sudden realization that another problem has arisen to which they were personally committed.

This personal commitment to the solution of a question which they had formulated produces a huge leap in their understanding of the scientific process, in their motivation and in the understanding of the concepts of acids and bases.

They continue their investigation:

Teacher:*Denise, can you tell me about the experiment you are doing today?*
Denise: *Well, I get two test tubes, but I don't fill them up with the same amount of water and I measure up the same amount of oxide, one spatula, and 7 drops of indicator. Tracey uses dirty test tubes, Sandra uses exactly the same amount of water but different amounts of indicator but the same amount of water and oxide.*

They say that the results might have been wrong the first week, for one of four reasons:

1. *They used different amounts of water.*
2. *They used different amounts of lead monoxide.*
3. *They used different amounts of indicator.*
4. *They used dirty tubes.*

The experiments they devise use a sophisticated technique called "a controlled experiment" where one variable (i.e. amount of water) is altered while all other

factors are kept constant. This concept is notoriously difficult for a major proportion of children at this age when taught in the more conventional ways.

They obtained their results.

***Teacher**: Now you've said "It's nothing to do with the amount of water it's nothing to do with the amount of oxide, or with dirty tubes, or the amount of indicator. In fact it doesn't seem to be to do with anything that you've tested.*
***Sandra:** No.*
***Teacher:** Now what do you think was different about the experiment that you did last week which makes it different to the experiment you did this week?*
***Tracey:** Well I suppose what we could try, sir, is that we could have say, different amounts of water in the test tubes and different amounts of oxide and dirty test tubes and see whether it was all four of them.*

They are saying "It wasn't one factor on its own that made the difference but it could have been caused by all these factors acting together!

***Teacher**:Yes, that is certainly true. It could have been. What about this idea. The oxide should turn indicator a blue colour, but last week you had one tube that went red. Could it have been a dirty test tube which had acid in it?*
***Tracey:** Wouldn't it go neutral, because a certain amount of acid and a certain amount of alkali in there . . . shouldn't it turn neutral, but we didn't. We got a very strong acid and one got a very strong alkali.*
***Teacher:** You think about that.*
***Sandra:** I don't get what you mean.*
***Tracey:** I thought about it before I asked you!*
***Teacher:** Well, think about it again. Sandra, you don't understand what we are driving at, do you?*
***Sandra:** No.*
***Teacher:** The mistake might have occured last week because you had a dirty test tube and it had acid in it already. Now what would happen if you did all this in a test tube which was dirty to begin with, with a bit of acid. What might happen?*
***Sandra:** What . . . what, you mean if we did an ordinary experiment and it turned acid and then we tipped it out without washing it, do you mean?*
***Teacher:** Mm.*
***Judith:** Well then it would turn acid wouldn't it.*
***Tracey:** Well no, it wouldn't. If you have got lead monoxide and that's, well we found out it was a very strong alkali. A strong alkali and a strong acid is going to make neutral isn't it?*
***Teacher:** Well it depends . . .*
***Sandra:** You've got to have virtually the same haven't you.*
***Teacher:** Yes it's a balance isn't it.*

Sandra: *Tracey said if you had a strong acid and a strong alkali - would make a neutral, but how is Tracey going to know how much acid is in there to add the same amount of alkali?*
Teacher*: Good point.*
Judith: *If we use a syringe, then we could put exactly the same in, so we know that it's balancing, or we know if it's stronger or weaker.*
Sandra: *But we don't know how much acid is in there.*

A minute ago Sandra didn't understand the problem the other girls were raising. She has now grasped the idea of 'acids cancelling out alkalis' and of her own accord is appreciating the idea of balancing out different quantities of acids and alkalis whose "strength" is un-known. A giant leap.

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As I have said above I think the data shows my focus on understanding the professional development of teachers in relation to improving the quality of pupils' learning. My research interest is in understanding the appropriate ways of conducting an enquiry of the form, 'How do I improve my practice?'. I am also interested in understanding the nature of the explanations ('why' questions) and educational knowledge generated in such enquiries. That is I am interested in questions of methodology in the 'how' questions and questions of epistemology in the 'why' questions. As my enquiry continued I concentrated on these questions and give some answers in the 1980 paper below.

In the terms of my action research I was concerned that I did not understand an appropriate methodology for researching questions of the kind, 'How do I improve my practice?, I believed that by working with a group of teachers who were trying to improve their practice, I would come to understand an appropriate methodology. I acted, evaluated my actions and modified my concerns, ideas and actions in the light of the evaluations. I also believed that I would come to understand the nature of the educational knowledge created by indivdiuals as they attempted to understand the processes of improving their practice. The results are described in the 1980 and 1985 papers below.

Before presenting the papers I want to draw you into the first of three experiences which have had a profound influence on my educational development. As you read the following letter terminating my employment I am asking you to empathise with my existence as a living contradiction. At the moment I received the letter I was working on the above account. I think the account shows a commitment to search for a form of educational theory can be related directly to the experiences, language and lives of those whose educational development the theory should have the capacity fo explain. I take it that one of the tests of the validity of a theory is that it has the capacity to produce a valid explanation for an individual case subsumed by the theory. In explaining my own persistence in the face of the pressures which follow I

think you should hold on to my view of myself as a creative academic. I see my productive life as being intimately related to revealing a form of educational theory which can be directly related to the educational development of those individuals which the theory is produced to explain. If pushed to explain why I think this enquiry is worthwhile pursuing I answer with my belief that educational theory is a form of dialogue which has profound implications for the future of humanity and I want to make a positive contribution to that future through my work in education. I do not think that any further justification is necessary or, in my case, possible. On reading my story, my students have commented that they think that many people would have given up working in such circumstances. My explanation for why I continued contains the determination not to put up with violations to my integrity and academic freedom, the challenges to my originality, the truth of power in imposing what counts as educational knowledge and the basic lack of care for an educational researcher's contribution to educational knowledge.