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STUDENTS AT THE FRONT: USING PERFORMANCE  
INDICATORS FOR PROFESSIONAL DEVELOPMENT

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# Students at the front: using performance indicators for professional development

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## Summary

A performance indicator system, the A-level Information System (ALIS), was used as a basis for an action research project. Teachers identified a teaching technique which had appeared in the ALIS data to be little used and yet associated with good outcomes, both cognitive and affective. The teaching technique consisted of having students present work to the rest of the class, i.e. 'student presentations'.

Teachers deliberately introduced some student presentations into their lessons at intervals during a six-week period. The students rated their lessons on weekly questionnaires using semantic differentials. There was clear evidence for the positive influence of student presentations on some of the affective measures. One of these measures (stimulating vs tedious) showed a positive effect across all teaching groups, no matter what the nature of the presentations.

These findings are discussed in relation to evidence provided by the participating teachers, as well as from other research. Whilst the study provides partial evidence for positive effects from the use of student presentations, it is perhaps of more importance when seen as an illustration of how data from a system of Performance Indicators can be used as a basis for professional development. The use of 'process indicators' in this way is close to the kind of activity which is envisaged in 'total quality' systems, representing a 'quality circle' using data to improve the system.

*Keywords:* A-levels, ALIS, monitoring, school effectiveness, school improvement, classroom processes

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## Introduction

Many adults are required to make oral presentations to groups in their professional life and yet it seems that in most schools and colleges even advanced students are given little experience of presenting their work in any form other than written reports to the teacher. Is there any evidence that having students present their work orally to the class might have immediate benefits, or at least do no harm?

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A partial answer to this question was available from data arising from the A-level<sup>1</sup> Information System (ALIS). Students in classes which had used student presentations tended to have better than expected examination performance and more positive attitudes towards the subject being studied. However, this correlational data needed investigation by experimental methods. The way in which this was accomplished, and the findings, are described in this paper.

### The context

ALIS is an extensive performance indicator system for A-level provision which was designed by Fitz-Gibbon working at the University of Newcastle upon Tyne in 1983. At the time of the research reported here, it involved some 120 institutions and more than 6,000 students throughout the country. The system has been described elsewhere (Fitz-Gibbon, 1985, 1990a, 1990b; Fitz-Gibbon, Tymms and Hazelwood, 1989) and has been used as a basis for a number of research publications (Tymms and Fitz-Gibbon, 1991, 1992; Tymms, 1990, 1991; Williamson and Fitz-Gibbon, 1990; Fitz-Gibbon, 1991). The system is described briefly below.

Students on A-level courses are given a high-level ability test and they complete an extensive questionnaire. Both the test and the questionnaire are administered by university employees. The questionnaire asks students a range of questions including some which are used to measure their attitudes to A-level subjects and some which ask about the frequencies of use of a variety of teaching activities which could have been part of their A-level lessons.

Data from the ability test, the questionnaire and A-level results are used to produce three reports for each A-level subject: the Examination Report, the Attitudes Report and the Processes Report. These reports are sent to each A-level department participating in ALIS. The Examination Report gives rank-ordered lists ('league tables'), school by school, of information which can enable a department to judge its performance against that of other departments working with similar students. The two 'league tables' of most interest are probably those showing the mean A-level grades achieved that year and the 'value added' which is the relative progress made by students. The value-added measures compare progress made from the baseline of GCSE results and the aptitude test. Departments can compare their indicators with those of departments in other institutions without fear of publicity since code names are used to identify particular schools or colleges. The Attitudes Report gives details of the attitudes and aspirations of students. In the third report, the Processes Report, the frequency of use of selected teaching strategies is reported, based on students' questionnaire responses. Unlike the first two reports, in which data are reported department by department, the third report presents analyses based on all the data for that A-level subject but eschews any report of processes in use in individual departments.

Two important analyses relate the frequency of use of each teaching strategy with exam success (value added) and the students' attitudes to the A-level subject. It was this third Process Report which was used as the basis for setting up the action research reported here.

The teaching strategies which are considered in the ALIS set of 'Performance Indicators' are all actions which a teacher could choose to adopt, such as using handouts or dictated notes. They represent 'alterable variables' (Bloom, 1979) or what are increasingly referred to as 'process variables'. Some strategies were drawn from a research project conducted at the Centre for Educational Sociology in

Edinburgh (Gray, McPherson and Raffae, 1983), some were derived from theory and others from experience. The teaching strategy considered here, student presentations, was one of those derived from experience in inner city teaching in the Los Angeles area.

The frequency of use of 'student presentations' was assessed by the two items shown below, extracted from the ALIS questionnaire.

**In class: Please indicate how often you have studied in each of the following ways in this subject in class:**

Presenting your work to the class

Listening to another student presenting work in the class

*Please use this scale:*

- 1 represents 'never or almost never'
- 2 represents 'about once a term'
- 3 represents 'about once a month'
- 4 represents 'about once a fortnight'
- 5 represents 'about once or twice a week'
- 6 represents 'about every lesson'

### Setting up the action research

Teachers were invited to attend a series of three Saturday-morning workshops organized by curriculum area. The workshops were advertised as events designed to aid in the understanding of ALIS and to improve A-level teaching through research.

In all, 59 teachers attended the meetings; each workshop consisted of a series of explanations and discussions organized as follows:

- The history of, and rationale behind, ALIS.
- The Exam Report: how fair performance indicators are computed for exam results.
- Attitude measurement and its use within ALIS.
- Sources of knowledge in education (surveys, action research, case studies and experimentation).
- Hypothesis generation.
- Development of an action plan.

Although many of the teachers had had access to the ALIS reports, it was considered important to go through the reports with the groups, so that the participants felt comfortable with the tables and the statistical techniques behind them. It was also considered important to spend some time on the ways in which correlational data, such as that found within ALIS, can be interpreted, and the ways in which firmer evidence for cause and effect can be established through controlled interventions, i.e. experiments.

Following these sessions spent on deepening knowledge of the ALIS reports, the participants split into small groups and worked through the Processes Reports with the task of finding in the data a teaching technique which met three criteria:

- (i) it was not widely used;
- (ii) its use was positively correlated with good attitudes amongst students;
- (iii) its use was positively correlated with better than expected examination results.

**TABLE 1** Listening to another student presenting work

<i>Subject taught:</i>	<i>Percentage<sup>1</sup> using</i>	<i>Attitude<sup>2</sup> to the subject</i>	<i>Exam<sup>3</sup> performance</i>
Mathematics	15	++	+
Physics	25	+	+
Chemistry	27	0	-
Biology	25	0	0
English literature	67	0	+
French	66	0	++
German	63	+	+
History	45	0	0
Geography	35	++	+
Economics	31	++	+
General Studies	35	+	+

*Notes:*

1. The percentage of students who reported listening to other students presenting work at least once a term.
  2. The attitudes of students to the subject who reported to other students present their work at least once a term compared to the average attitudes for that subject.
  3. The A-level exam achievement above expectations (using prior achievement as a predictor) of those who reported listening to other students present their work at least once a term.
- + higher than average or expectation.  
 0 average or expected value.  
 - below average or expectation.  
 ++ positive results significant at the 1 per cent level.  
 -- negative results significant at the 1 per cent level would have been shown thus, had there been any.

In the first workshop, the Maths and Science teachers came to the joint decision that having pupils present their work to the class generally fitted the criteria, and it was decided to develop an action plan which would focus on a piece of research related to that method of teaching. The languages teachers came to the same decision, even though they were looking at data from languages A-levels. By the time it came to the third workshop, it had become clear that a joint investigation across all curriculum areas would make sense and the participants were, therefore, told of the decisions made by the previous two groups. They then also decided, having considered the evidence, to become part of a general investigation into having students present work to the rest of the class.

Table 1 brings together a summary of some of the data which the teachers had considered. This has been selected from a wealth of detailed relationships and, to some extent, simplifies the more complicated picture considered by the teachers. We have used the questionnaire item 'Listening to the others present their work to the class', rather than the item 'Presenting your work to the class', because the latter could possibly have been answered positively by a small number of particularly able students, selected for their ability to present work to the class. We were interested in the impact of the teaching strategy on *all* the students in the class. The 'Listening to others . . .' item would pick up this aspect of the strategy.

*Examples of student presentations*

At the Saturday workshops a number of teachers described various ways in which they had involved students in presenting work to the rest of the class; for example:



- (a) A group of A-level Biology students were given a section of the syllabus to prepare for dissemination to the rest of the class. They delivered their work through printed notes (one side of A4) and by a group presentation to the class.
- (b) Following difficulty with an A-level Maths problem, a pair of students got to grips with it during the break between lessons. On the spur of the moment, they were asked to show others how to solve it during the next lesson.

It was also noted that a suggestion for ways of involving students in presentations is given in *Revised Nuffield Science, Physics Teachers Guide 1*, Units A to G, pp. xxxiii–xxxiv.

### The action plan

The results summarized in Table 1 are correlational; they indicated associations which had been found in one year of the ALIS data. Whilst the results indicated that students reporting a particular activity (presentations) in a particular subject were also students with better than expected attitudes to their subjects, it does not follow that having students present their work to the rest of the class will improve their attitudes. Correlation does not mean causation. To investigate causation it is necessary to intervene and to look for the effect of the intervention, if any. To this end, a piece of action research was formulated.

The plan had to take into account the diversity of teaching experience and the variety of classroom demands which the participants brought to the group. It was also hoped to intervene in the teaching of A-level in a natural way which could be seen as an alternative teaching possibility by other teachers not involved in the project, so that any findings from the research would be seen to have direct applicability.

With these provisos in mind, the following scheme was devised and implemented. Over a six-week period, taught without any other changes to the usual flow of events, some form of student presentation was introduced into weeks 3, 4 and 6. The six-week period was located in the first term of the 1990 academic year, and where possible, it was made up of consecutive weeks.

At the end of each week, the students were asked to complete a questionnaire on which they rated various teaching activities and the week's lessons overall on a series of semantic differentials (Osgood, Suci and Tannenbaum, 1957). It should be noted here that the attitudes measured as ALIS indicators were general attitudes to the subject studied, not specific attitudes to the various teaching strategies employed in teaching the subject. It is quite possible for students to dislike particular activities and yet be positive overall to the subject, responding that they 'looked forward to lessons in the subject', for example. In responding to the ALIS questionnaire students first answered six questions about their attitude to a subject and, some time later in the questionnaire, reported how frequently various learning activities seemed to have taken place over the two years of their course.

The only restriction on the teachers involved in the project was that the research was to involve A-level teaching alone. No restriction was put on the kind of student presentation to be employed, but examples were given from the descriptions which several teachers had given of their own experiences during the Saturday-morning workshops. There were no requirements that the presentation should last a certain time or involve a certain number of pupils.

## Results

At a follow-up workshop after the research had been carried out, a number of teachers described their experiences and offered thoughts and recommendations for future action. Three examples are given below:

*A. Bowen*

**Subject: Geography**

Both A-level groups (U61 + U62) were studying vegetation and U61 was also studying meteorology. I selected 'Tropical Rain Forests' as a suitable topic for the pupil presentations. In the week prior to the presentations, I provided each student with background information on rain forests. Each class was subdivided into small groups and assigned a section of the rain forest topic – e.g. the climate, soils and relief of rain forest areas; the structure of the vegetation; human influence, etc. Each student was given all the relevant information for all the topics. They were instructed to research their own topic in detail and to prepare a presentation for the remainder of the class the following week. The topics given could be further subdivided to ensure that all members of each group participated in some way.

Over the two weeks of presentation, not all the students presented work, some groups relied on a spokesperson. The presentations varied in length from 3 to 10 minutes. Following each one, there was an opportunity for questions and discussion. In general, the students listened to the presentation without recording the information. Each group prepared their work on paper, and following the presentations, each group's work was duplicated and distributed to the other students.

Following the two weeks of presentations, a summary essay was set to test their knowledge and understanding.

In the sixth week, U61 presented work on urban climates in a similar way to the first presentations and this was followed by an essay. I was away from the school for the sixth week of U62 but a colleague carried out a presentation with them.

### Observations

1 The students became casual at filling in the questionnaires. I also think they guessed that they were supposed to show a more positive attitude to the weeks with pupil presentations! As a result of the way the timetabling worked out, U61 had to fill in questionnaires on the Monday following each week. Their last Geography lesson was the Wednesday before and I am sure their memories let them down!

2 The presentations with the larger group (U61,  $n = 17$ ) were quite formal, from the front of the class, etc. and discussion was less easy. They still wanted me to be the focus. In the smaller groups (U62,  $n = 2 \times 8$ ), despite the fact that I hardly knew them, the groups were smaller, we sat round a table and discussion was freer.

3 Presentations varied, but in general they weren't good. In future, far more help is needed on this.

4 Most students participated well, but it was obvious that a minority did not take a proper part in the presentation or its preparation.

5 The essays were of a similar standard to those done under 'normal' conditions, apart from a couple who were either absent for part of the work or who had not taken a proper role.



6 In most cases, there was a positive response to the presentations, although they lacked confidence not only in doing their presentations, but in accepting the work of other students.

7 The exercise did create work for myself in preparing the materials for the students and in photocopying the work so each student had a copy.

*T. Farrell*

**Subject: Maths**

We presently run two parallel Year 12 A-level groups that are shared between three teachers. Each group has  $5 \times 1$  hour lessons and the split is three lessons and two lessons with each teacher. It was decided to target one of these groups for the experiment, the other group would be taught in the usual way (some pupil presentations took place in this group as usual in our department).

We decided to start the scheme just before the half-term holiday in order that the recording would take place alongside that for ROA. The pupils were given advance notice of pupil presentations and were selected in an order by drawing lots. My class were set a particular question to do from text and present a solution to the remainder of the group ( $n = 8$ ). For their other two lessons they were to present a specimen solution to a problem set from text that they had all covered.

For my presentations, I set up a video camera and recorded the presentations; if I were to repeat this in future, I would leave the video for the second and third presentations as the students found it off-putting.

Overall, the presentations given in my class and in David Cross's class were quite good and gave us an insight into the level of preparation each of the students had done, as well as their ability to talk to a group. Throughout the presentations the students were encouraged to ask questions relating to the problems and the replies gave a further indication of the presenters' understanding of the problems being presented.

From the outset, the students were made aware that teacher help was available if required to ensure that none would be left high and dry when it was their turn to present their solution.

This was repeated according to the pre-arranged timetable. The results were always recorded during the lesson on Friday (my lesson), and the students were aware that the recording was to be based on a week's learning (including the remainder of the Friday's lesson). Initially, the recording took quite a long time to complete, but after a few weeks speeded up – probably because they were used to the format and the questions being asked.

*R. Woolhouse*

**Subject: Economics**

**Introduction**

The exercise was undertaken with a second-year Economics A-level class. The class consisted of 15 students, and it was the better of the two sets we had in that year group. Given it was the better set, it still contained students with a wide range of ability. I divided the group into  $6 \times 2$  and  $1 \times 3$ . They remained in friendship groups.

**Organization**

I told the class at the very beginning that they were part of a research project and that I would be trying various different teaching techniques. Since I had never made use of pupil presentations for mainstream syllabus items, they realized that these were probably central to the experiment. They were a bit concerned

they might suffer if someone did the work badly, so I promised to provide back-up notes where these were needed. I gave the first five groups their tasks in the first week of the research. They each were given a small section within the topic 'Inflation'. I suggested they should provide information and set tasks for their fellow students. I was to be a resource they should consult when in difficulties. The remaining groups reported on various aspects of our joining the ERM (Exchange Rate Mechanism for Europe), which occurred at a most opportune moment.

### Outcomes

In all but one instance, the content provided was perfectly adequate. In the debriefing, I did highlight, through discussion, the key issues where there was a danger they were lost in a mass of description. Some of the less well-prepared students could not deal with questions and were grilled by the others. I was surprised how little mercy the class showed.

As a general rule, they used very traditional teaching methods and did not set useful tasks to reinforce the content.

### Conclusions

They seemed quite happy to do this research but may have just been humouring me. I will try this again, but will try to give more guidance re teaching methods and back-up work. There is no doubt that I overestimated their presentation skills. I will be more likely to use presentations with topical issues rather than mainstream syllabus items, i.e. for applications rather than the basic theory. I think they will find this more interesting.

Their understanding of the topic was not impaired by the learning method (according to the evidence of the trial exams). They were a little less keen to include the topic in their revision programme than normal. The students not involved in the presentation were perhaps keener than normal to do the background reading, no bad thing itself.

### Questionnaire results

Over 1,000 students' questionnaires were received from 17 different teaching groups. These groups came from nine schools and the responses were equally divided between 17- and 18-year-olds (upper and lower sixth form classes). The class sizes varied from five to 32 and came from Maths, Biology, Physics, Geography, Economics, French and English.

For the purposes of this report, the most important data were the semantic differential ratings given by the students at the end of each week for all of that week's work in the relevant subject. The five-point scales are shown below:

Disliked	1 2 3 4 5	Enjoyed
Tedious	1 2 3 4 5	Stimulating
Irrelevant	1 2 3 4 5	Useful
Embarrassing	1 2 3 4 5	Relaxing
Hard	1 2 3 4 5	Easy
Not Involved	1 2 3 4 5	Involving

Figure 1 shows the average responses from all the questionnaires received. The first thing to notice in the figure is that the average responses indicated a generally

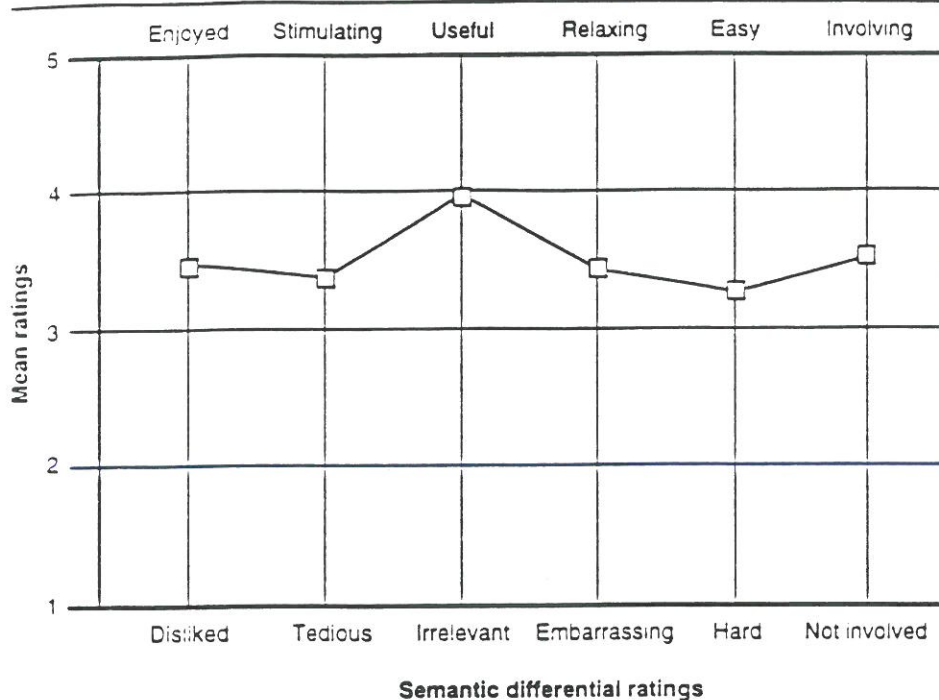


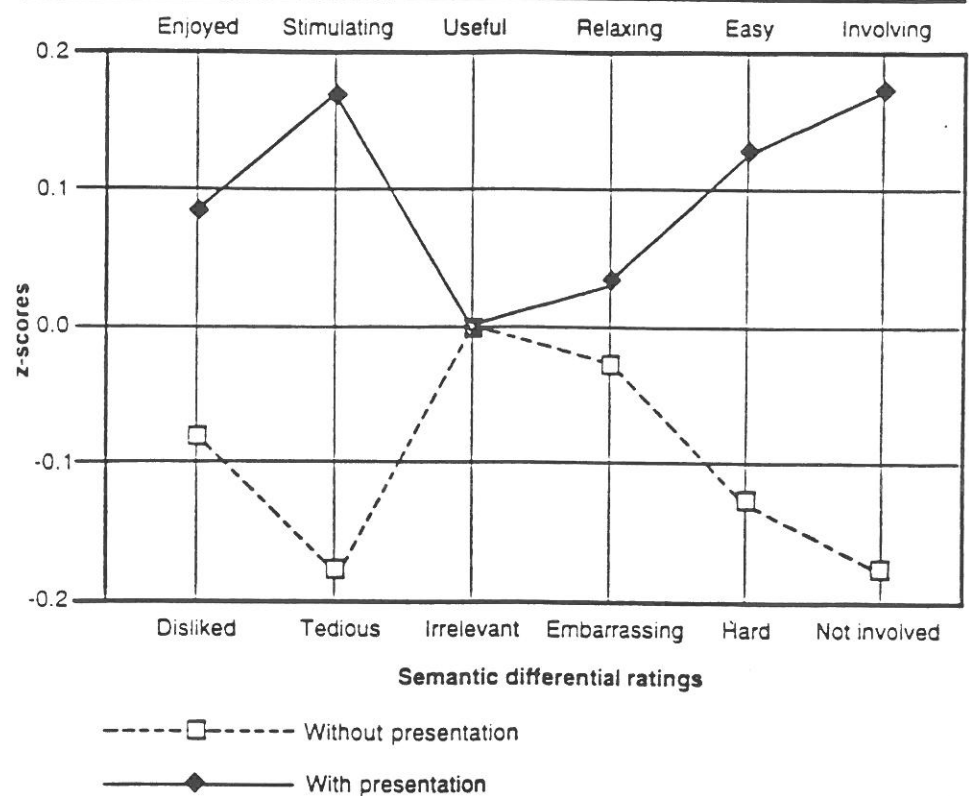
FIGURE 1 Mean ratings for all weeks and all responses

positive set of students' responses to their education, a finding which is mirrored by other data, both qualitative and quantitative, collected within the ALIS project: A-level students like their courses. The second point is that, although the ratings were clustered between 3 and 4 on the graph, there were statistically significant differences between them ( $p < 0.0005$ ; see Table 2). That is, if the ratings had been distributed at random amongst the six differentials, then the pattern of differences which appeared (or more extreme patterns) would have done so in less than five distributions out of 10,000. There were also significant differences between the ratings given by students in different teaching groups ( $p = 0.007$ ).

Generally the differentials were straightforward to interpret, the higher number representing the more desirable response, with the possible exception of the easy/hard scale where it is not necessarily clear that one side is better than the other. However, given comparable content, it would seem reasonable to suppose that a successful lesson, rather than an unsuccessful one, would be perceived as easy rather than hard.

Each student's average ratings on each of the differentials for the three weeks without student presentations (the 'no-presentations mode') and the three weeks with presentations (the 'presentations mode') was found and each rating converted to a z-score using the means and standard deviations of the averaged data (z-scores have an average of 0 and a standard deviation of 1). The results are shown in Figure 2.

Statistical analysis of the data (using repeated measures MANOVA – see Table 2) indicated that there were very significant differences between the two teaching modes, with and without presentations ( $p = < 0.0005$ ). Figure 2 and univariate repeated measures ANOVA indicated that the important differences were that students reported finding their lessons more stimulating and more involving in weeks when students had presented their work. Figure 2 also indicates that there was



**FIGURE 2** Responses from the weeks of use or non-use of presentations

a tendency for the students to report enjoying the week's work more, and finding it easier, when there were student presentations. There was no evidence that the presentations involved embarrassment. The two modes were perceived as equally useful.

**TABLE 2** Significance levels for tests of hypotheses

<i>Semantic differential</i>	<i>Const.</i>	<i>Group</i>	<i>Teaching mode</i>	<i>Gp × mode</i>
Enjoyed/disliked	0.06	0.001	0.93	0.07
Stimulating/tedious	0.03	0.03	0.005	0.49
Useful/irrelevant	0.000	0.12	0.27	0.66
Relaxing/embarrassing	0.82	0.02	0.69	0.93
Easy/hard	0.001	0.003	0.14	0.87
Involving/not involving	0.000	0.001	0.000	0.000
MANOVA	0.000	0.007	0.000	0.000

*Notes:*

Const. – tests the hypothesis that the scores were equal to the mean score of 3.45.

Group – tests the hypothesis that there was no difference between the scores of the teaching groups.

Teaching mode – tests the hypothesis that there was no difference between the scores in weeks when there were presentations and when there were not, i.e. between 'modes'.

Gp × mode – tests the hypothesis that the changes (if any) over the two modes were the same for all teaching groups.

MANOVA – considers all semantic differentials simultaneously; each other row considers each semantic differential individually.



The data also indicated that there were differences between teaching groups for all the differentials except the useful/irrelevant dimension. This indicates, not surprisingly, that students in different classes were rating their weeks differently. The differences were particularly striking for the enjoy/dislike, easy/hard and involving/not involving ratings. Furthermore, there was an interaction between teaching group membership and the difference in ratings as a whole between the two modes ( $p = <0.0005$ ). This implies that the shape of the patterns shown in Figure 2 varied significantly from class to class. The variation was particularly associated with the involving/not involving differential.

The interaction for the involving/not involving differential between classes and modes is particularly important since it emphasizes the commonsense notion that the way in which the interventions were approached within the classes had an influence on the students' changes in their perception of their level of involvement in their A-level lessons. The lack of interaction for all the other ratings ( $p > 0.05$ ) is also important since it implies that the increased stimulation which the students reported was independent of the nature of the student presentations; perhaps a more surprising finding.

## Discussion

Evidence has been presented above which indicates that when some students were involved in presenting their own work to the rest of the class, then all the students generally found the lessons more involving and more stimulating. There was also some indication that the work was perceived as easier and more enjoyable. The influence of student presentations on standards of work was not specifically investigated by this research, but informal observation, discussed at a follow-up workshop with the teachers, suggested that there were no great changes in this respect, although ALIS survey data has shown that better than expected exam results had been generally associated with more frequent use of student presentations – not just in one set of data, but over three consecutive years.

Are there reasons why this particular technique should have this beneficial influence? One explanation which is often advanced for the success of innovations is the Hawthorne effect – the supposed positive influence of simply being given attention. There are several reasons why that would not seem to be an adequate explanation of the present findings. In the first place, the students were being studied for all six weeks but they only experienced presentations for three weeks. Secondly, a re-examination of the original Hawthorne investigation (Parsons, 1987) has been able to explain the higher production rates reported at Hawthorne – not by reference to the attention given to the workers, but by a feedback mechanism whereby the workers were regularly informed of their productivity and, therefore, of their financial rewards.

Furthermore, there is good reason to doubt the existence of a Hawthorne effect at all. It has been advocated that, when conducting experiments in education, one should not only have an experimental and a control group, but also a Hawthorne group which receives as much attention as the experimental group but no experimental intervention. A recent meta analysis of such experiments failed to find any evidence of differences between the control and Hawthorne groups (Adair, Sharpe and Huynh, 1989).

But if the Hawthorne effect does not provide an adequate explanation, perhaps the very newness of the activity could explain it. However, newness in itself certainly



does not guarantee success, as has been well documented by Fullan (1991). In any case, several of the teachers in the group did in fact use students' presentations regularly in their teaching and yet advantages were found for all groups. No doubt, it is possible to have too much of a good thing; and no doubt also, teaching at its best involves variety, but there must surely be some underlying explanations for the value of student presentations.

There have been a number of experiments in controlled conditions showing that when people expect to teach material that they are studying they actually learn the material better. Both Zajonc (1960) and Bargh and Schul (1980) used controlled field experiments with learning tasks of short duration (for example, five to 15 minutes). Students who learned with the expectation that they would be called upon to teach did better than those who simply learned the material understanding that they would be tested on it subsequently. In these controlled experiments the amount of time studying was held constant between the two groups, but would the results generalize to more naturalistic learning situations, such as the learning of complex materials in non-time-limited situations? This problem was addressed by an experiment by Benware and Deci (1984) in which college students using an article on brain functioning were asked to learn it with the expectation of teaching it or being tested on it. The results favoured the group who had learnt in order to teach. Their rote-learning score, although not statistically significantly better than that of the other group, showed an effect size of 0.46. On conceptual learning, there was a massive and statistically significant effect size of 1.79 ('effect size' is calculated from Benware and Deci, 1984, p. 762). The students who had been asked to learn in order to teach also reported significantly more interest in the work (effect size 1.20) and more enjoyment (effect size 0.97). Benware and Deci tend to explain the benefit of what they term 'active vs passive motivation' in terms of intrinsic as opposed to extrinsic motivation. Learning in order to teach somebody is seen as more intrinsically motivating than learning in order to achieve on a test in which the marks awarded might be seen as serving as an extrinsic motivator. Zajonc (1960), on the other hand, explained the differences in terms of cognitive set, suggesting that the cognitive set required for transmitting information induced more organization of the material, more differentiation and more complexity than when subjects were essentially receiving information rather than transmitting.

The finding in the present study, that the student presentations were more stimulating and more involving than the lessons in which there were no student presentations, is in line with the finding in Benware and Deci (1984), who discussed the fact that students 'who learned in order to teach perceived themselves to be very active in the teaching paradigm and very passive in the examination paradigm' (p. 753). They noted that the students who had only been exposed to the studying-in-order-to-be-tested paradigm had no contrasting experience and were not able to differentiate the amount of passivity or activity involved. They suggest that this 'indicates that students need to have had a recent experience with a more active type of learning paradigm to recognise the passivity of the traditional examination paradigm'.

These findings suggest that those who made the presentations would have felt particularly involved and stimulated and were likely to have learnt that particular work more thoroughly than those who did not make presentations.

There is the further possibility that the act of actually making the presentation would, itself, have further positive effects on students' cognitive achievements. Verbalization has frequently been shown to have the effect of improving thinking, for example, Gagné and Smith (1962). Why should verbalization improve learning? Perhaps we listen to ourselves speak or simply think harder when we have to speak?

Again, the effect is established but the reasons for it will probably require in-depth investigations by cognitive scientists. Although the mechanisms for the effect of verbalization are not established, the benefits appear to be reliably available. Teaching strategies should, therefore, make use of this effect.

Yet another possibility is simply that, when people know they have to teach, they spend more time on preparation, perhaps feeling threatened or intimidated by the prospect. The positive effect may be due simply to the length of time spent in cognitive contact with the task. However, students did not report the 'presentation mode' as more embarrassing. Increased levels of stress have, however, been reported as having positive effects on learning (Koob, Fray and Inversion, 1976); the experiments involved rats learning mazes with and without paper-clips on their tails, so the relevance of the study might be questioned.

In summary, there are a variety of ways in which to explain benefits to those who *present* their work. Is there any reason to expect that those who *listen* to a student presentation will learn as well or better than by listening to a presentation by a teacher? One might surmise an initial higher level of interest in what the fellow student is saying than in what the teacher is saying, if only because the teacher is heard more often in the classroom. There is also, though, the possibility that one's fellow students will use language which is more readily understood than the language used by a teacher. This can be thought of in terms of the student presenter being more likely to be addressing his or her fellow students in the 'zone of proximal development' (Vygotsky, 1962, 1978). The fact that students in this investigation found the presentations more stimulating may also be a source of explanation for any better learning that might result as in the Koob, Fray and Inversion (1976) study noted earlier. They reported their work under the optimistic title, 'Stimulation: sufficient condition for learning?'; they were in fact stimulating rats by pinching their tails, but the point was that anything that created a higher level of arousal might improve learning, in rats or in students.

The A-level teaching situation in the UK is far removed from an inner city junior high school situation in the USA, yet the same strategy, namely student presentation to a class, seems to have been beneficial in both situations, although we have data on only the A-level situation. One indisputable benefit in the inner city situation should be mentioned. When a student is at the front of the class, the teacher can be at the back. From this strategic vantage-point, much mischief can be nipped in the bud: students have to turn round to see if you are watching them.

## Conclusions

We started with the finding from the survey data provided by the A-level Information System that in classrooms where presentations were used by students not only were the attitudes of students to the subject more positive, but the examination results tended to be better than expected. From this correlational finding interventions were designed over a six-week period in which students were assigned to present work to the class in a variety of subjects under the supervision of a variety of teachers. Where these interventions took place, the reports from students suggested that the lessons were more enjoyable, stimulating, easier and more involving.

Unfortunately, it is never easy to implement a controlled intervention in naturalistic settings. The teachers who actually attended the entirely voluntary Saturday-morning workshops were self-selected and a second selection took place of

those teachers who managed to implement the six weeks of data collection and three weeks of student presentations. Furthermore, in the naturalistic setting contextual factors can loom large. The kind of topic used for the presentation may have an impact. The extent to which teachers worked with the pupils who were to make presentations may have had an impact on the quality of the presentations and, possibly, on the students' intrinsic or extrinsic motivation. The nature of the notes which were produced to accompany the presentations may have an impact on the students who were listening and on the students who developed the notes.

It is particularly important to acknowledge also that there were problems associated with the undoubted tendency for student presentations to slow down the coverage of the curriculum. At A-level there is a large, content-rich curriculum to be covered. Other problems revolved around the students' approach to the presentations. In some cases, it was felt that their diffidence and inexperience were a severe handicap and would set a limitation on the effectiveness of the use of student presentations. Other teachers saw this very difficulty as a reason why it was important that all students had the opportunity to make presentations. Several noted that the use of more student-centred learning in the earlier years of schooling was sometimes having a visible impact on students' self-confidence in addressing a group.

The aim of this piece of collaborative action research was not to produce eternal verities, but to illustrate how an indicator system can be used to stimulate the search for improvement which has always been a hallmark of professional concern, and which is currently promoted in terms of 'total quality' or 'total quality management' (Deming, 1986). Given data from an indicator system, data generated in part from their own students, teachers have a new source of information about the apparent effects of their teaching. They can work on 'grounded' hypotheses, hypotheses arising from data. Sometimes these hypotheses may be consistent with current fashions, such as the 'active learning' promoted by the Technical and Vocational Education Initiative, and sometimes not.

In addition to data in the indicator system, we have illustrated here another important source of possibly supporting evidence: that derived from theories tested by controlled experiments conducted in other contexts. It cannot be assumed that these experiments, and the theories on which they are based, generalize to one's own particular teaching situation, but the existence of such corroboration, even if tentative evidence, provides another piece in the complex jigsaw a teacher assembles in designing a course.

The design of teaching strategies for a course of study is a complex project, requiring consideration of motivational effects of various strategies, the immediate learning, the efficiency of the learning and the long-term impact (sleeping effects), not to mention quality-of-life considerations for both students and teachers. In undertaking this complex task certainty may never be achieved, but the sources of evidence presented in this paper – from the indicator system, from theories supported by controlled experiments and from the action research – all suggest that giving students responsibility for presenting work to the rest of the class is a technique which teachers might well find useful.

Most importantly, we have provided an example of how hypotheses generated in a Performance Indicator system can be tested in the field by collaborative research with practising teachers.



## Note

- 1 The A-level (Advanced level) examination is a pre-university examination taken by 18-year-olds. The usual requirement for university entrance in England and Wales for such students is that they should have passed two or more subjects at A-level. The exam is commonly taken after two years of study.

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