

The problem with differentiation

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Tailoring tasks to the abilities of individual students is an increasingly popular method of differentiation in science, but does it work?

The issue of differentiation in schools has been high on the educational agenda for years. The Department of Education and Science was talking about it in the 70s (DES, 1978) and 80s (DES, 1980) and OFSTED has been talking about it in the 90s (OFSTED, 1993). Every school senior management team worthy of its name has differentiation in its development plan or as part of the school's policy statement. Every dedicated teacher is concerned that his or her students are undertaking learning experiences suited to their ability.

However, awareness of students' differing abilities and needs and knowing how to fulfil these needs adequately are quite different matters. Strategies for introducing differentiation range from different tasks to different groupings (Bailey and Bridges, 1983). The latter involves moving away from the idea of mixed-ability teaching to streaming or setting. The former demands that tasks are tailored to the needs of individual students. Although this tailoring requires enormous organisation and input from teaching staff, many schools are following this route of implementing differentiation by task.

By definition, differentiation by task involves students within the same classroom either receiving different tasks or using different routes to complete the same task. Theoretically, matching task to ability

sounds an ideal solution to the differentiation problem and appears to answer the criticism of OFSTED that '*secondary schools need to give attention to matching work more effectively to the knowledge and skills of pupils of different abilities*' (OFSTED, 1993).

In practice, however, this type of differentiation may be more difficult to implement and more likely to fail than is apparent at first glance. This report describes an attempt to introduce differentiation by task through colour-coded workcards, a method that on the surface seemed likely to succeed, but actually failed miserably. The incident described arose during an action research project undertaken by the author for Oxford University's Postgraduate Diploma in Educational Studies, which was designed to examine the preparation of a differentiated programme of study in science for year 9 (14-year-old) students.

The background

The inner city secondary school in which this incident took place had a reputation of being 'tough', full of delinquents, vandalism, joy-riders and drug-pushers. Academically it was continually at the bottom of the county's school league tables. The catchment area included a number of large council estates with a high percentage of single-parent families and unemployment, and students widely perceived themselves as 'no-hopers', perceptions which were reinforced both in and out of school.

The school advocated mixed-ability teaching throughout all curriculum areas at all levels in an attempt to discourage the labelling of students as high or low ability. When senior management heard of an impending OFSTED inspection, a development plan was drawn up to determine how differentiation could be introduced effectively in the school. Each curriculum area was expected to find a method of

ABSTRACT

An attempt to introduce differentiation by task in an inner city secondary school is described. Workcards setting out the same task at three different levels were tested in two ways with a class of 14-year-olds and a control group. The differentiated workcards led to no significant improvement in the work of the lower ability students in the two test classes and had a seriously demotivating effect on them. The high and medium-ability students did improve their performance.

differentiation which could be trialled and then written into the existing programmes of study. In science, differentiation by task was adopted for trialling. It was attempted first in year 9 science lessons. A task was selected and workcards prepared at three different levels; the lower ability students received workcards which made use of diagrams rather than words to explain the task. The higher ability students received cards which required the students to complete a table in order to correctly undertake the task. Middle range students received a card with an appropriate mix of graphics and text. On the face of it, the task was beautifully differentiated with each student receiving appropriate instruction to be able to succeed in the investigation.

Monitoring the task

To determine the students' reactions to the new method of teaching, selected groups were tape-recorded during the lesson. They had become habituated to the tape-recorders over a number of previous lessons, and talked quite freely when the recorders were being used. A score card assessment technique was also used to determine whether the new method of teaching was successful in terms of the learning processes and the outcomes. Scores were awarded throughout the lesson for aspects of the task, such as preparing dilutions, measuring volumes, seeking help, time off task and the final report. This method was validated by another teacher who also scored the students on the same criteria. The scores were compared and were found to correlate significantly ($t < 2.262$ at the 5% significance level). Students in a control class, who undertook the same task using the standard undifferentiated teaching materials, were also scored using the same criteria. The recordings, together with a comparison of the students' scores with those of the control group, were expected to generate evidence to determine the effectiveness of the workcards.

The first approach

In the first class in which this approach was attempted, the students worked in groups. Each student received a workcard which the teacher had assessed as being in line with their ability level. This meant that students in the same groups received different cards. In one group of four girls, Jane received a high-ability card, Belinda and Kaylie middle-ability cards, and Debbie

a low-ability card. The ensuing conversation reflects their reaction:

Belinda: *We've all got different colour ones.*

Jane: *They're all different, but we're doing the same thing really.*

Debbie: *Mine's pathetic, it's all pictures! Anyone would think I can't read or somethin'.*

Jane: *Well you can't properly.*

Belinda: *Yours is the worst ... look you've got to fill all those missing bits in.*

Jane: *That's no problem.*

Debbie: *I'm not going to do it, it's not fair.*

Jane: *She's trying to make it easy for you, that's all.*

Debbie: *Well she needn't bother 'cos I ain't doing it.*

Jane, who received the card for a higher-ability student, was encouraged by seeing herself as brighter than the others. Debbie, on the other hand, was hurt and upset by the labelling of less able, reinforced by Jane's comments. Debbie refused to be involved in the task, remained sullen and uncommunicative for the rest of the lesson and received very low marks on the score card.

Two boys working together reacted in a similar way when they received their cards, Joseph's a high-ability one and Phil's a low-ability card:

Phil: *Why've you got that one, and I've got this ... are we doing different ones, then?*

Joseph: *No, yours is easier, see.*

Phil: *Huh, so you're the boff then! She thinks I'm thick just like everybody else.*

Joseph: *Course you're thick, everyone knows that!*

Joseph, like Jane, was encouraged by the workcard and seeing himself as more able than Phil. He achieved a high mark on the score card. Phil, however, contributed little to the task, and received low marks.

At the end of the lesson, the students engaged in a discussion with the teacher about the cards. Their reactions were mixed:

Jane: *I thought [the cards] were brilliant.*

Phil: *You would.*

Teacher: *OK Phil ... you didn't rate them then? (long pause)*

Joseph: *He thinks you think he's thick.*

Phil: *No I don't ... it's just ...*

Debbie: *Why should we have stuff for kids with pictures and not words – it's stupid.*

and later:

Jane: *I just liked filling in the missing bits and thinking about it ... it was good.*

Debbie: *That's 'cos you're the boff and you get the best.*

Teacher: *Would you have liked the card that Jane had then?*

Debbie: *No point 'cos I'm too thick to do it.*

Paul: *Everyone says we're useless and now you're saying it too.*

Again, the pattern was clear: those receiving the high-ability workcards were encouraged; those receiving the low-ability cards were discouraged. Peer attitudes, which are powerful influences in adolescents, also contributed to the plummeting self-esteem of the low-ability students.

The second approach

Rather than abandon the differentiated cards altogether, a new approach was considered using another year 9 class. Instead of giving workcards to individual students, it was decided to allocate cards to groups, the ability level of which was assessed by looking at all the students in the group. This led to some high-ability students in the mixed-ability groups receiving low-ability workcards, but it was hoped that the intra-group conflicts would be removed. Although these conflicts were reduced, they were replaced with inter-group conflicts as groups became involved in ribbing and abuse of other groups with different cards:

Nick: *Which colour have you lot got then?*

Jenny: *Green – so?*

Nick: *Let's have a look at yours then. Huh, theirs is harder than ours ... trust you lot, Miss's favourites, to get the best one. Hey Dave, Jenny's got a green one, what colour's yours?*

Dave: *Blue, so what?*

Nick: *Thought you were a boff Dave, you must be p—— off getting that, it's for dickheads.*

Dave: *I don't care. I hate science anyway.*

Lecky: *You're the best in science Dave, don't be a prat.*

Dave: *Well if Miss thinks I'm so good why have I got this w—— thing then.*

Dave had previously worked hard in science, had very high standards of work and had shown himself to be particularly sensitive to messages relating to his ability, having been encouraged when told by the teacher how well he had progressed. He was so angered by receiving the low-ability card, which was more related to his fellow group members than to him, that he had to be excluded from the lesson for disruption and aggression. In an interview afterwards it was very clear that the name-calling from Nick, together with his perception that the card labelled him as low-ability, had badly damaged his already fragile self-esteem. It was several months before Dave was working as well in science as he had been before this incident.

The score card data

The scores from both classes, together with those from the control class which did not receive the differentiated workcards, were analysed using a two-sample (unequal variance) Student's *t*-test. These were performed between:

- the main and the control group;
- the medium and high-ability students in the main and control groups;
- the low-ability students in the main and control groups.

The *t*-tests showed that by providing the differentiated workcards there was an overall improvement in performance between the groups ($t = 5.77$, critical $t = 2.201$ at a 5 per cent significance level). There was also a significant difference between the medium and high-ability students in both classes and those in the control group ($t = 9.481$, critical $t = 2.570$ at a 5 per cent significance level). However, there was no significant difference between the low-ability students in either of the two classes and those in the control group ($t = 0.277$, critical $t = 4.302$ at a 5 per cent significance level). From this it can be seen that the low-ability students did not benefit from receiving the differentiated workcards, whereas the high and medium-ability students did improve their performance, as compared with students who worked without the cards.

The problem with differentiation

Rather than helping the students to succeed in the investigation, the differentiated card led many students to become demotivated and even damaged as they appeared to perceive themselves as different from their peers, effectively labelled as lower ability. The reaction from many of the students was dramatic and disturbing. Some refused to complete the task, while others were openly aggressive. This early attempt at differentiation by task was a dismal failure because of the damaged self-esteem and demotivational effects of differentiation which resulted in labelling.

The lower ability students perceived that receiving an easier workcard implied that they were regarded as 'thick': '*she thinks I'm thick just like everybody else*', '*everyone says we're useless and now you're saying it too*'. Some students showed reluctance even to attempt the task. One boy was so angered by this intervention, and the reactions of his peers when he was given a card which effectively labelled him as lower ability, that his behaviour led to exclusion. Higher ability students, however, were encouraged by the workcards, which effectively bestowed upon them the more acceptable label of 'bright'. The negative effect of this kind of labelling was one of the reasons why streaming in schools was felt to be so damaging (Douglas, 1964). Introducing differentiated cards had the same effect as streaming the class, with all the associated problems. The mixed-ability ethos of the school had been created originally to avoid these problems.

The reactions to labelling appear to be in line with research carried out into attribution theory, where failing pupils readily perceive their failures as being

the result of an external cause rather than an internal inability (Dweck, 1975). Dweck found that pupils were unable, or unwilling, to pursue tasks at which they had failed because they would or could not take personal responsibility for their failure. In this incident, low-ability students confronted by a differentiated task, which possibly underlined their failings, attributed their lack of ability to the perceived opinion of the teacher, and not only failed the task, but refused to attempt it.

Attributing failure to an external cause, whilst attributing success to internal ability, is a well-known phenomenon and is a protective mechanism for an individual's self-esteem (Weiner, 1979, 1992). Weiner describes students who, when faced with negative attitudes, see their failures as the responsibility of others – teachers, parents, even peers. Weiner emphasises in his theory that what is important is not what caused the failure, but what the individual thinks caused the failure: '*Everyone says we're useless and now you're saying it too*'. This may be the clearest statement of why these young people fail; not because they are inherently failures but because they perceive that others expect them to fail.

Differentiation is an important issue. Further work with the same students showed that a different approach using peer collaboration was more successful because it enhanced the students' self-image and self-esteem rather than destroying it (Hall, 1995). OFSTED's requirement that work should be matched to the knowledge and skills of differing ability students is a noble requirement; how this is done appears to demand both careful consideration and a deep understanding of the students involved.

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