

Do as many pre-test and post-test measures as possible so that you can measure your own achievements and share them with students and colleagues.

Be clear about your own targets – for example, by saying, “I intend to raise self-esteem by increasing...”

Pupils need to be encouraged, rewarded and helped to become independent learners. They need to be taught to give each other positive feedback, to ask for and offer help, to set personal targets for themselves, to identify their own and others’ strengths. Later, they can learn to give and receive negative feedback, which is not the same as criticism or put-downs.

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### Further reading

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## Improving science achievement by raising self-esteem

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### AIM

*To assess whether students’ performance in science could be improved by increasing their self-esteem and generating positive support and feedback from their fellow students.*

### SUMMARY OF FINDINGS FOR THIS CASE STUDY

- ★ Students involved in the project have retained knowledge and understanding of the key scientific facts studied.
- ★ Students have remembered the learning strategies outlined to them during the project.
- ★ There has been a reduction in disruptive behaviour.
- ★ Students in both test groups showed improved module test scores.
- ★ There was a marked increase in student involvement in question and answer sessions.
- ★ Although self-esteem scores were disappointing, there was a considerably improved attitude to science in all students.
- ★ The “learning culture” has improved significantly.

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## Background

The school serves two council estates south of the city. Current Year 7 NFER CAT test results predict only 40 per cent will achieve GCSE grades A-G; only one student is predicted to gain five A-C grades. Reading test scores show that 79 per cent read at two or more years below their age and 32 per cent read at four or more years below their age.

Work to improve literacy is a constant issue for the school. Lawrence's 1986 research showed great improvements when literacy and low self-esteem were tackled together. Would the same hold true for science?

## The project

The project was an intervention research model, involving pre-test, intervention and post-test. It was carried out in three phases: data collection, intervention programme and findings. The three-phased approach was itself used in three ways:

i) In the summer term 1996 there was a pilot scheme with a bottom set science group in Year 8. It yielded pre-test and post-test module results and pre-test and post-test self-esteem scores, together with a video of strategies used with the class. There were interviews with the teacher in September, when the class started Year 9.

ii) In the autumn term 1996 the main group study took place, again involving a bottom set science group in Year 8. It yielded pre-test and post-test module results, and work is in progress on the pre-test and post-test self-esteem scores.

iii) For comparative purposes, work was also carried out with another science teacher and the Year 8 top set.

## Data collection

It was decided to use as many pre-test and post-test measures as possible because the sample was small and the intervention programme used a wide range of strategies:

*“Be clear about learning objectives when planning the unit of work.”*

★ *module test scores before and after the project were compared to measure academic improvement;*

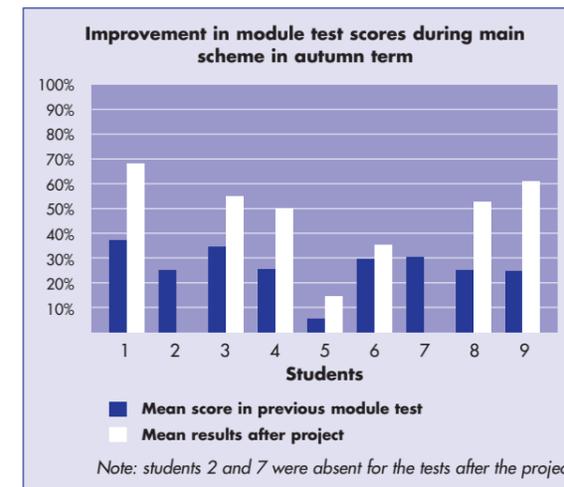
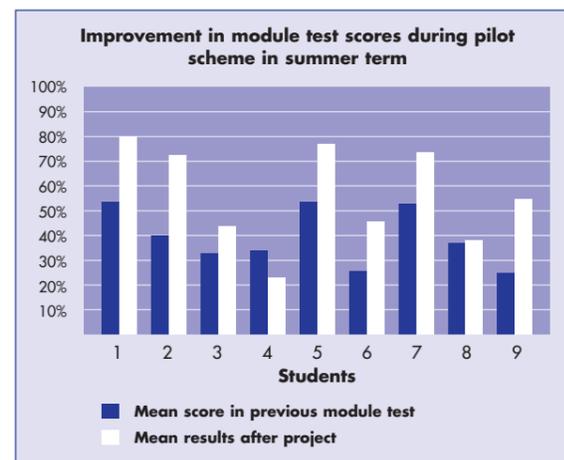
- ★ *“BG Steem” self-esteem tests were carried out before and after the project;*
- ★ *video evidence of teaching strategies was used to demonstrate research findings;*
- ★ *taped interviews illustrated long-term changes;*
- ★ *strategies were tested by a second teacher in order to check the conclusions;*
- ★ *the class was observed by a second teacher before and after the project to measure changes in behaviour and participation.*

*“Pupils need to be encouraged, rewarded and helped to become independent learners.”*

## The intervention programme

An incremental reward system was used to encourage self-esteem, oral contributions and academic achievement. A merit award required 20 stickers; 40 stickers brought a certificate and a letter home; and 60 stickers won the student a “gold run” prize, a special certificate and a letter home.

## Results



## Academic progress

The module tests for both the pilot scheme and the main study were pleasing. The expectation is that other teachers can achieve similar results when using the intervention programme, thus removing the “teacher charisma” variable. These results have yet to be demonstrated, but I am already working with the whole science department to test them. When it is considered that these results have been achieved by bottom set students with special needs, it is likely that the improvements students made in this project would be even greater with students across the ability range.

## Self-esteem

The self-esteem scores were disappointing and at variance with my own observations of the group. Several students now say, “Science is my best subject,” or describe another student as “a super scientist like me now, sir.” There are several possible explanations for these low results and discrepancies. It may be that the test is not reliable, in that it is not sophisticated enough for the students. Or it could be trying to measure too much – that is, self-esteem overall (academic, physical, family, self-image, peer perception). Another possibility is that self-esteem in science is one small part of the overall academic self-esteem – especially in a secondary school – and academic self-esteem is only one part of total self-esteem.

Therefore, what is needed is a test which:

- ★ *asks questions in a more probing manner (possibly with scenarios to select from);*
- ★ *focuses on subject-specific self-esteem, so that each subject can have its own score;*
- ★ *provides an overall academic self-esteem score.*

## Programme

What follows are recommendations to teachers wishing to adopt this project to improve achievements in their own science programmes.

Explain clearly to students the rules for awarding stickers. Reinforce a disciplinary routine through rewards if necessary. Consistently reward attempts to answer questions in science lessons, and doubly reward scientific answers. Structure, encourage and reward positive peer feedback and group work. Set up a staged reward system with increasingly important certificates or letters. Use the stickers frequently, particularly for students reluctant to answer. Use stickers for one or two modules only. Return to them after several weeks, but tell the students you are doing this.

Be clear about learning objectives when planning the unit of work. The importance of this cannot be stressed enough. Objectives need to be communicated clearly to the students by using phrases such as, “By the end of this lesson you should know/understand/be able to...”

The teacher should take responsibility for lack of understanding. Rather than, “You weren’t listening,” say, “I haven’t explained that very well.” Teach students how to work in pairs. For example, demonstrate listening skills. Get students to work in pairs in every lesson for a short period.

Increase the opportunities for students to talk by varying the pace and tasks in lessons. Set oral and explanation tasks in every lesson. Accept all contributions regardless of how “correct” they are. Encourage “no blame” with every attempt. The aim is to encourage students to participate and to think.