

The Gifted and Talented Student in Design and Technology at Key Stage 3

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Abstract

Awareness of the needs of gifted and talented (GAT) students has been raised in recent times through the introduction of Excellence in Cities (EiC) and other initiatives. However, there has been little work carried out in the design and technology (D&T) area. This research sets out to investigate the use of standardised tests in the form of the Middle Years Information System (MidYis) for identification of GAT students within D&T. It also looks at whether a more creative delivery can encourage even more imaginative ideas and improved satisfaction levels from these students.

MidYis data for a Year 7 cohort is examined and compared to the original system of using professional judgements. Student self-nomination is also considered. Students were grouped according to MidYis ability for an initial group design task and questionnaires are used to determine their opinions on the project.

Results indicate that identification needs to be initially based on quantitative data although professional judgements must be employed to identify the student with a particular talent. It is concluded that self-nomination is not appropriate within D&T at this point but may be useful within whole school development work in the GAT area. Data should also be used in the identification of underachievement.

Products produced by the test group, across all ability levels, showed more imagination in design than the control group. GAT students preferred to work with peers of similar ability for designing although when making they found 'passing on' their knowledge to less able students consolidated their own learning.

Keywords

gifted and talented, design, Key Stage 3, textiles, identification, creativity

The Excellence in Cities (EiC) initiative, introduced following the setting up of a Gifted and Talented (GAT) Advisory Group by the new government in 1998, has raised awareness of the needs of the GAT student across the curriculum. 'The major principles of gifted education – identification, acceleration and enrichment – have been accommodated in the programme' Freeman (2001: 229), but there is little data available in the design and technology (D&T) context. The EiC OFSTED report (Dec. 2001) noted that many schools offer study support to GAT students at Key Stage 4, but that a greater emphasis is needed on developing students' capacity to work independently at an earlier stage. The national Key Stage 3 strategy has placed more weight on raising the attainment levels of 11-14 year-old students and these issues, along with the move to one integrated attainment target in D&T introduced by the Qualifications and Curriculum Authority (QCA) 2000 National Curriculum Review, have lead to this research focusing on Key Stage 3 students and, in particular, the 2001 Year 7 cohort of my school based in Hartlepool EiC.

Identification is a key aspect of provision for the gifted and talented.

'All schools are required to identify a GAT cohort comprising 5-10% of each year group within KS3 and KS4. These are students who achieve, or who have the ability to achieve, at a level significantly in advance of the average for their year group in their school.'

(Department for Education and Skills (DfES) 2002)

David George (2001: 34) advocates that identification procedures should include:

- IQ testing
- test scores, achievement
- parent inventory
- self inventory
- staff inventory/checklist
- student grades/report cards
- student products
- subjective teacher comments.

The Department for Education and Skills (DfES) suggests that schools should draw on both quantitative and qualitative data to obtain the best results in the identification process. It is hoped to examine some of the areas considered to determine which approach best suits this school.

At present, identification of GAT students in school is carried out by teacher nomination in curriculum department areas. Within D&T, staff have used their professional judgements to assess classroom accomplishments when identifying individuals in a particular material area, with little or no prior performance data being used for reference. This has led to a large number of students being nominated with little coherence of standards across the department.

to define and measure. Torrance (1980) devised tests of creative thinking to help recognise the creative child and Gardner (1993) stresses the importance of creativity within his theory of multiple intelligences. George (2001) explains creative thinking as divergent, producing unconventional responses to conventional tasks and in the *National Advisory Committee on Creative and Cultural Education (NACCCE) Report*, Dawn French says 'A creative approach to teaching should improve academic results not detract from them'.

There is an obvious sense in which children cannot be 'taught' creativity. Many teachers see creative teaching simply in terms of 'teaching creatively', using imaginative approaches to make learning more interesting, exciting and effective. However, the

Table 1: Staff nominations of GAT students after each project.

| | Autumn | Spring | Summer | Individual students nominated consistently in same category | Total number of different students nominated |
|------------------------------------|--|---|---|--|---|
| Top 5% | 16 12 Girls 4 Boys | 17 13 Girls 4 Boys | 13 9 Girls 4 Boys | 5 | |
| Top 10% | 22 20 Girls 2 Boys | 24 23 Girls 1 Boys | 19 9 Girls 10 Boys | 1 | |
| Top 20% | 16 14 Girls 2 Boys | 20 13 Girls 7 Boys | 34 23 Girls 11 Boys | 2 | |
| Total (Cohort 219 students) | 54(23.4%) 46 Girls 8 Boys | 61(26.5%) 49 Girls 12 Boys | 66(28.6%) 41 Girls 25 Boys | 8 | 107(48.8%)* 70 Girls 37 Boys |

*(% of total cohort should be 20)

The school decided to introduce the Middle Years Information System (MidYis) – a standardised ability test carried out within four areas; vocabulary, maths, non-verbal and skills – for the 2001 Year 7 cohort. Students can then be sorted by the results to give various rank orders and a quantitative measure can be applied to identify the relevant GAT students. However, do these general tests accurately reflect D&T ability and talent?

OFSTED has long reported that making is regularly better than designing in D&T with students being taught practical techniques rather than being encouraged to have innovative ideas. One common factor, firmly established in the many checklists for GAT (George, 2001: 42), is an ability to demonstrate creativity. Creativity is an extremely difficult concept

NACCCE Report is more concerned with encouraging teachers to 'teach for creativity', developing forms of teaching which are intended to develop young people's *own* creative thinking or behaviour.

Consequently, it was decided to make a simple modification to the delivery of a textile project by introducing a group design exercise in the first session, prior to any specific material knowledge being taught, to explore if this produced more creative designs than the previous technique of designing at a later stage. This exercise was intended to create a non-threatening environment in which students felt comfortable to take risks and not to be too concerned with the practicalities of construction. The opinions of the test group were then compared to a control group who had had a 'teacher-led' delivery

Table 2: Summary of MidYis testing

| | | | | Number of students not in overall top 50 MidYis group but in top 50 of individual test areas | | | |
|---------------------------|-------------------------------------|----------------------------------|--|--|---|---|--|
| | Total size | 20% | Top 50 students ranked by MidYis overall score | Vocabulary | Maths | Non-verbal | Skills |
| Year 7 2001 cohort | 219 105 Girls 114 Boys | 44 21 Girls 23 Boys | 50 25 Girls 25 Boys | 15 (30%)* 4 Girls 11 Boys | 10 (20%)* 6 Girls 4 Boys | 15 (30%)* 8 Girls 7 Boys | 19 (38%)* 11 Girls 8 Boys |

Table 3: Staff nomination of students compared to MidYis testing.

| Top 50 students in each area | MidYis | Vocabulary | Maths | Non-verbal | Skills |
|---|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Number of students missed by staff nominations | 22 4 Girls 18 Boys | 24 6 Girls 18 Boys | 20 2 Girls 18 Boys | 20 5 Girls 15 Boys | 22 5 Girls 17 Boys |

*(% missed from overall top 50 results)

(traditional emphasis on making) to examine if the more creative delivery (stressing experimentation and discovery) encouraged GAT students to produce higher-level ideas and to be more satisfied with their projects.

Aims of the research

The research sets out to look into the provision for GAT students within D&T at Key Stage 3 in a Hartlepool school. Two questions are to be considered:

- Are test results from MidYis a reliable indicator for technology GAT students?
- Does a more creative delivery encourage GAT students to produce higher-level ideas and to be more satisfied with their projects?

Research methods/collection of data

Data was collected from staff identification of students, MidYis testing and student questionnaires.

Findings and discussion

Almost half the cohort have been identified as gifted and talented over the course of the year by different teachers (see Table 1), clearly there is a problem with the current system. Some suggestions may be the lack of agreed detailed criteria or baseline assessments, student's individual preferences for different material areas and staff personality differences combined with low expectations due to lack of identification of GAT. Attractive presentation may also have influenced nominations as it does not necessarily reflect ability.

Other factors could be pressure of work on staff leading to lack of quality time for assessment of potential, lack of differentiation or challenge in the curriculum, emphasis on 'making' rather than creativity and national assessment criteria not being sufficiently rigorously applied.

Some of these areas were identified as part of a whole school problem, hence the introduction of MidYis testing for the 2001 cohort to provide independent baseline assessment data.

Despite 107 students of the cohort being nominated as GAT under the current system, 22 of the most able, according to MidYis, were never mentioned (see Tables 2 and 3). Many factors may have contributed to this including underachievement, attendance, behaviour problems and gender differences. The quiet student who does not demand attention (Wallace 2000: 31) and the 'academically able' student who may not necessarily be talented in D&T could also have affected nominations. Some students may have under/over performed in the tests and some may argue that 'pencil and paper' tests do not accurately reflect D&T ability. Nevertheless, on consideration of these various factors, it was decided to identify GAT students within the sample groups as those with an overall MidYis A grade.

The wide variation in the numbers of students considering themselves to be more able (see Table 4) could be explained in a number of ways. Initially, no benchmark criteria were given for the 'average'

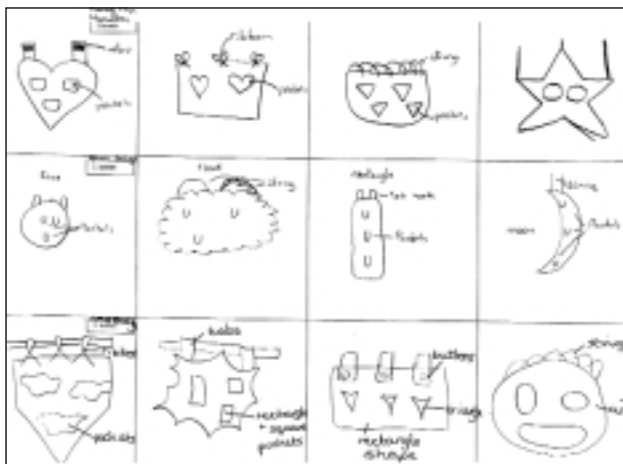
Table 4: Student self-identification of ability.

| | MidYis A grade students in group | Better than some/most students generally | A grade students acknowledging general ability | Better than some/most students in D&T | A grade students acknowledging D&T ability |
|----------------|---|---|---|--|---|
| Control | 5 2 Girls 3 Boys | 9 5 Girls 4 Boys | 4 2 Girls 2 Boys | 11 5 Girls 6 Boys | 3 1 Girls 2 Boys |
| Test | 5 4 Girls 1 Boys | 5 1 Girls 4 Boys | 1 0 Girls 1 Boys | 3 0 Girls 3 Boys | 1 0 Girls 1 Boys |

student, hence students may only have been judging themselves against friendship groups which tend to be of similar abilities. Secondly, students of this age (11-12 years) prefer to be seen as part of a group rather than as an individual and so would be reluctant to put themselves forward as different. Thirdly, the teaching group/self-esteem of the sample may have been influenced by the approach of different teachers and some students may have felt less/more confident about self-identification. If this area were to be used as part of the identification process, then much clearer guidelines would have to be discussed. Perhaps some work on a whole school self/peer group nomination system would be more informative (Wallace 2002: 46).

Change of delivery to place more emphasis on creativity

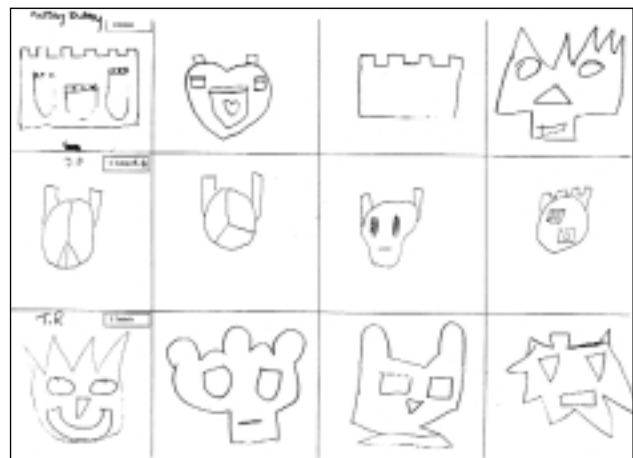
Textiles is a totally new experience for the Year 7 D&T groups with very little prior knowledge in place. The original teacher-led approach used in the project was to provide experience of materials and equipment



Group 1 – most able – coped well and enjoyed the experience. They made use of a good range of different ideas and utilised annotation effectively to produce designs that were creative and functional.

prior to producing ideas for storage hanging (traditional emphasis on making!). With the test group, a group design exercise employing a strong emphasis on ‘safe risk taking’ was used. Students were encouraged throughout the project to investigate and try out the skills necessary to implement their original ideas and discover for themselves which restrictions had to be placed on the construction phase.

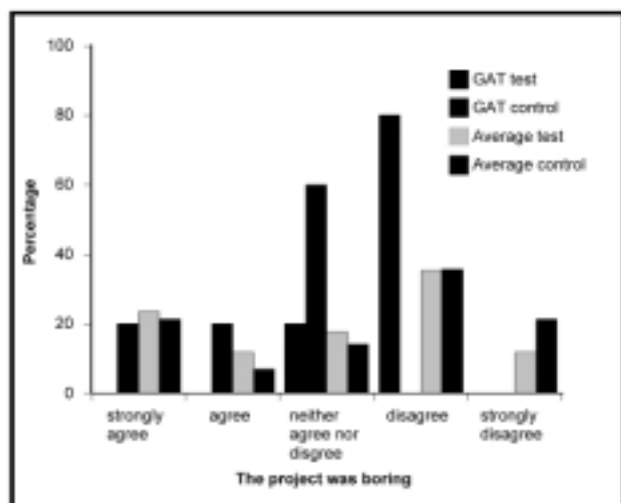
Ability groups determined by MidYis scores were used for this session. This is an important factor in the use of the activity as, when trialled previously with mixed ability groupings, the more able students had found it particularly frustrating, feeling that they had not received any useful input from the less able members of their group. The results show the range of ideas produced and, when asked, all students agreed or strongly agreed that the exercise had been useful.



Group 6 – least able – demonstrates the ‘developmental’ rather than ‘new’ aspect of designing. No annotation is present and many of the ideas are reworked versions of another. This group found the exercise particularly difficult, as they had to think quickly, – one minute per idea (four ideas).

Questionnaire results

A questionnaire (appendix 1) developed from an Australian study by Anne Fritz (1998) was administered to both groups under exam conditions.



required to do more 'thinking' and make more individual decisions.

With regards to 'ease' in chart 2, the majority of

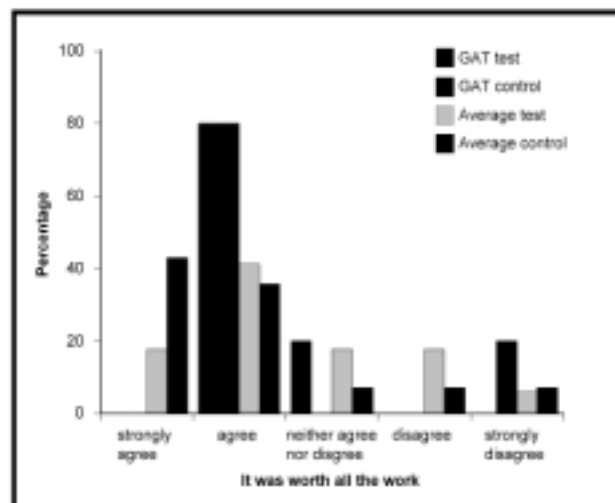


Chart 1: Satisfaction – disagreement on 'The project was boring' – agreement on 'It was worth all the work'.

It was emphasised that there were no 'wrong' answers and students were encouraged to be as truthful as possible. Fritz identified three factors that significantly defined the D&T learning experience (satisfaction, ease and independence) and the results were considered in relation to these. These were indicated in this questionnaire by questions 9, 11, 12, 18 and 19.

average students in the control group felt that they had finished the project easily and none were disappointed. However, in the test group, 50% experienced difficulty in completing the work and 10% were disappointed. This points towards their delivery being more demanding than that of the control group resulting in better curriculum differentiation.

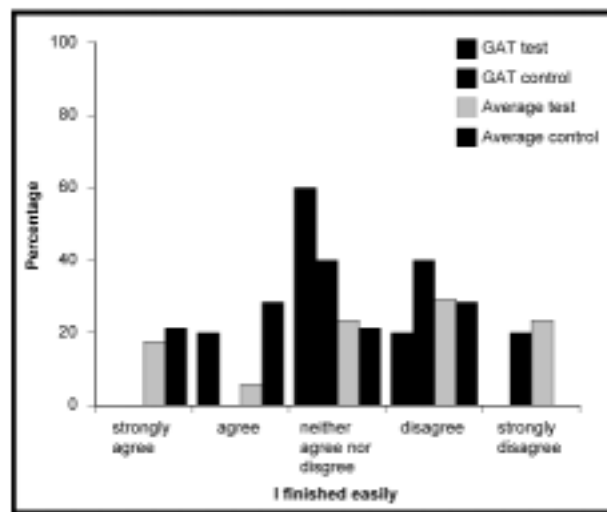
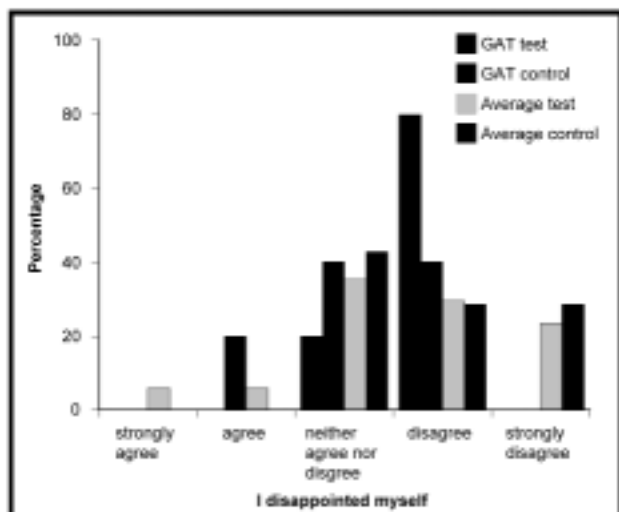


Chart 2: Ease - disagreement with 'I disappointed myself' - agreement with 'I finished easily'.

When looking at satisfaction in chart 1, the GAT students in the test group were more positive than those in the control group indicating a better learning experience for these students. However, the average students in the test group were less satisfied than those in the control – perhaps because they were

Students in the test group felt more independence than students in the control group according to chart 3. This demonstrates the individuality of the more creative approach and allows students to take more ownership of their work.

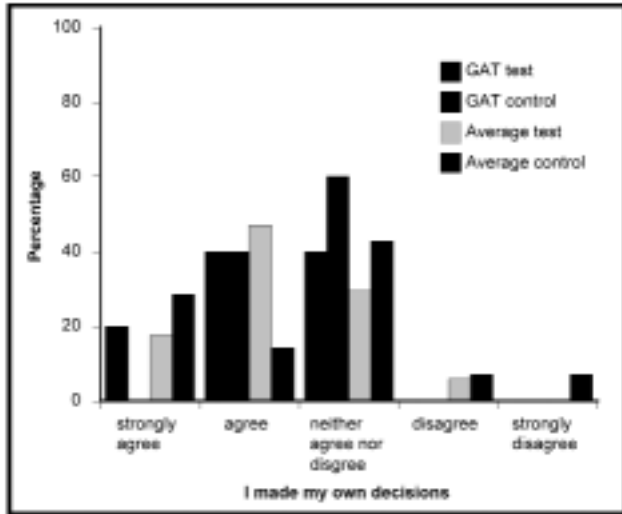


Chart 3: Independence – agreement with 'I made my own decisions'.

Final outcomes – see appendix 2 for illustrations

The control group products were all rectangular in shape with three hanging tabs. The shape of the backgrounds and number/type of suspension methods was more varied in the test group. On comparing the overall outcomes of both groups, it is clear that the test group demonstrated more creativity than the control group but that the standard of construction was similar.

These results lead to the conclusion that by arranging students within groups by ability and introducing a simple creative design exercise at the start of the project, GAT students were more satisfied with their work and produced higher-level initial ideas.

Conclusions

Identification

This small-scale research project has gathered evidence that demonstrates the inconsistencies of the current system of teacher identification of GAT when there are no clear guidelines to work from. It has considered the introduction of MidYis testing as an independent indicator of student ability and looked at the individual test areas within the overall score. Initially, the non-verbal section was thought to reflect most accurately D&T processes but, on looking at the final product results, this may not necessarily be so. The self-identification data did not provide reliable results, as students had no criteria to work from and limited experience of D&T. I would not recommend this as an identification tool at present. Nevertheless, it is clear that the MidYis testing does give an independent assessment of general ability against which D&T talents can be assessed and underachievement considered. Through the limited examination of the different test area scores done here, I feel that non-verbal, maths and skills scores of

students should be taken into account when producing initial ability lists for consideration. I would suggest that the ranked overall top 50 students plus 'extras' from these areas form an initial short list from which the top 20% can be selected by specialist D&T staff. This is in line with the DfEE (2002) recommendation for use of both quantitative and qualitative methods for identification.

Focus on creativity

The results demonstrate that students found the emphasis on creativity to be more challenging and motivating than the traditional style of delivery. The GAT students in the test group were more satisfied with their projects than the GAT in the control group. The variety of ideas produced initially by the group exercise showed a good range of imagination, although many of these were later simplified to accommodate production issues. Overall this proved to be a good method of enriching the curriculum for all and in particular for the GAT. With further improvement and development of strategies/resources to extend this focus, the level of differentiation within the group could be additionally enhanced.

However, for this approach is to be most successful, it is important that students of similar ability work together at the designing stage in order to stimulate more creative ideas. Once the focus of the project has been established, students can work effectively in friendship groups with GAT students offering support to the less able during construction. This, in turn, helps them to consolidate their own skills.

Implications

For identification of the design and technology gifted and talented students in a cohort:

- MidYis testing is a useful general tool for initial identification of GAT students
- individual category MidYis scores should be considered in addition to the overall grade – particularly non-verbal, maths and skills
- MidYis can be very useful when considering underachievement
- D&T staff need to agree clear guidelines to help identify GAT subject specific talents and ability levels both from the MidYis shortlist and any 'specially talented' in the general cohort
- professional judgements should be used throughout the year to note any special talents that have been missed in the identification process.

For delivery of the curriculum:

- D&T projects should be delivered with an emphasis

on creativity and individual choice to stimulate the interest and motivation of GAT students

- strategies to teach and develop creativity should be employed
- students of similar ability should be grouped together for designing activities in order to stimulate imagination
- the environment in which D&T is presented should be 'safe' for the student to be encouraged to demonstrate innovative ideas without fear of ridicule and failure.

'The most important developments in civilisation have come through the creative process, but ironically, most people have not been taught to create.'

Robert Frotz (1994), *The Path of Least Resistance*, cited in NACCCE report: 88

References

DfEE (2002)

www.standards.dfee.gov.uk/excellence/policies/giftedandtalented

DfEE/QCA (1999) *National Curriculum for England: Design and Technology*

Freeman, J. (2001) *Gifted Children Grown Up*, London: David Fulton

Fritz, A. (1998) 'Excellence in Technology: winning attitudes, environments and outcomes A comparative study of Design and Technology students and the winners of The Minister's Young Designers' Awards', University of Sydney, paper presented at the *European Conference on Educational Research*, Ljubljana, Slovenia, September, 1998: 17-20

Gardner, H. (1993) *Multiple Intelligences*, New York: Basic Books

George, D. (2001) *The Challenge of the Able Child*, London: David Fulton

National Advisory Committee on Creative and Cultural Education (NACCCE) (1999) *All our futures: creativity, culture and education*, DfEE

OFSTED (2001) *Providing for gifted and talented students: An Evaluation of Excellence in Cities and other grant-funded programmes*, DfEE

Torrance, E.P. (1980) 'Assessing the Further Reaches of Creative Potential', *Journal of Creative Behaviour*, 14: 1-19

Wallace, B. (2000) *Teaching the Very Able Child*, London: David Fulton

Appendix 1
Survey of opinions about Design and Technology projects

Please answer all questions as truthfully as possible by marking an X in the chosen box. (There are no wrong answers.) We want to know what you think about school in general and Design and Technology projects in particular. Please think about the last complete project you did when giving your answers.

| |
|-------------|
| Name..... |
| |
| Tutor |

1. Thinking about your schoolwork in general, do you think you are:

- better than most people in your year group
- better than some people in your year group
- about average for your year group
- not as good as some people in your year group
- not as good as most people in your year group

Here are some statements people have said about school. Please say how much you agree or disagree with each one.

2. 'How well you do at school will decide how successful you are for the rest of your life'.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

3. 'I want to leave school as soon as I can'.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

4. 'Teachers aren't interested in students like me'.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

5. 'Most of the time I enjoy lessons'.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

6. Thinking about how well you do in design and Technology, do you think you are:

11. 'The project was worth all the work'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

12. 'I made my own decisions'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

13. 'The project was really simple'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

14. 'I chose what I wanted to do'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

15. 'I enjoyed the planning and recording'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

16. 'The teacher organised us a lot'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

17. 'The teacher expected a lot from us'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

18. 'I disappointed myself'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

19. 'I finished easily'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

20. 'I did my best during this project'

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

21. What did you like best about the project?

22. Which part of the project shows your best work?

23. What was the most important thing you learnt from this project?

24. What would you do differently another time?

Appendix 2
Final products from Average students in test group

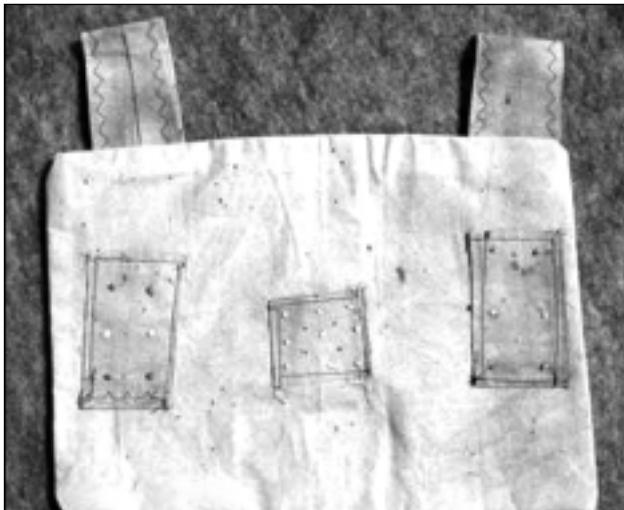
Samantha – skills and maths above average. A difficult idea tackled well.



Andrew – 5th highest skill score. Had trouble with stencilling and resorted to 3D painting for decoration. Accurate shape.



Christopher W – 107B for non-verbal, D grades for all other areas. No clear design on product. Required a high level of support.



10

Final products from GAT students in test group

Sarah was the only student to use an alternative method of hanging for her storage product. She persevered well to complete it to the original design, despite some construction problems towards the end.



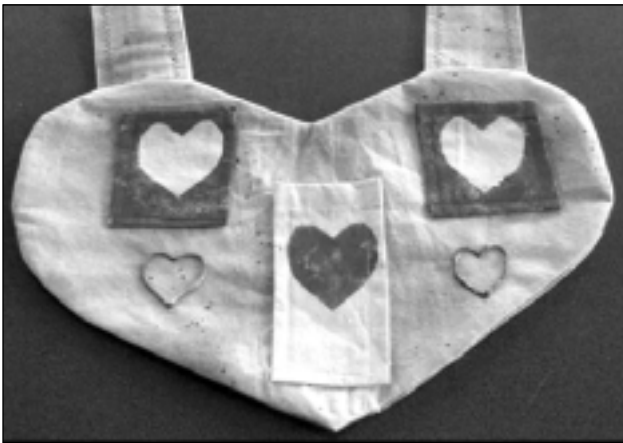
Adam discovered that a detailed design did not work particularly well when stencilling.



Rebecca worked with enthusiasm but was a little slapdash at times.



Amy was the most organised and competent but did not have the most imaginative idea.



Unfortunately Laura was absent.