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How do we encourage the next generation of engineers?

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Abstract*: The Diploma is a new national qualification designed with employers to meet the skills needs of the 21st century. The introduction of the Engineering Diploma in 2008 was anticipated with years of planning by Sheffield Children's and Young People's Directorate (CYPD). The Post-16 Engineering project has been designed to encourage students to choose a future in engineering. In September 2006 the first cohort enrolled at King Edward VII School where they studied A level Mathematics, and A levels in Physics, Design and Technology and AS Chemistry at Sheffield Hallam University, where engineering enhancement activities were also arranged. By design the partnership between the school and university continued to share the first delivery of the Advanced Engineering Diploma from September 2008. The units taught and supported at the university use specialist facilities and expertise. This strategy aims to introduce students to the community of practice of engineering. The effectiveness of this strategy has been reviewed in this research.*

This focussed research has considered: Has this Post-16 Engineering project inspired students to study engineering? How can the Engineering Diploma inspire the next generation of engineers? What lessons are there for educators to learn from this project? Answers to these questions will be used to inform future delivery. Data have been gathered through questionnaires to students and staff. The findings are presented with a focus on the student voice.

Introduction

By 2005 Sheffield Local Authority had become aware of a number of related issues that were acting as barriers to tackling the acute shortage of engineers with appropriate qualifications in the region. At that time the figures indicated the need for an additional 6000 level three (L3) engineers in South Yorkshire over the next five years. This information was highlighted by a report on "The Sheffield Manufacturing Industry" (Buckley, 2006) which provided a detailed survey of the manufacturing industry and employment within Sheffield and the region. In the report statistics suggested that Sheffield has the opportunity to build a strong advanced manufacturing base through "the growth of its specialised indigenous companies and by the attraction of high value companies in highly specific technology areas". Evidence of this happening can be seen with the growth of the Medical and Surgical Steel manufacturing industry in the city and the Advanced Manufacturing Park (AMP, 2010).

It is the area of educating engineers with skills required by the current and future labour market that has been a driving factor in the project reported and evaluated in this paper. It is highly unlikely that recruitment needs will be met through employing more engineering graduates and existing apprenticeship schemes. Over the last twenty years a major shortfall has developed at level two (L2). Engineering employers have recruited from each other or from staff made redundant by other companies. This has meant insufficient training emphasis in developing L2 and L3 skills amongst the younger generation.

The Introduction of the Engineering Diploma

Traditionally engineering companies have recruited from two areas: i) professional engineers from primarily the academic students who have been to university and become key to the management of companies, and ii) a semi-skilled labour force who have followed vocational pathways into the sector. The change in UKPLC from 'low tech' but high volume producers in the period that ended in the 1980s, to the low volume, high value-added producers of the economy today, has resulted in the need for a change in the skills requirements in the sector.

The Diploma is a new national qualification designed by employers to meet the skills needs of the 21st century. Primarily it reflects the need to break away from the two tier system of the past and to address the need for employees at technician level. The Diploma is a qualification for students aged 14 to 19 and is designed to become one of the three main educational choices alongside GCSEs, A levels and Apprenticeships. It combines theory and practice to equip students with the knowledge and experience they need to progress to higher education or work (Edexcel, Qualifications, 2010). The Diploma is distinctly different to the BTEC National Diploma which is a vocational qualification taken in England and Wales and Northern Ireland by young people aged 16 and over and by adults. The structure and equivalence of the new Diploma qualifications at L2 and L3 are shown in Appendix A.

Engineering Education within Sheffield

In 2005 engagement in engineering education in Sheffield was mostly through interest in the Key Stage 4 Design and Technology (D&T) curriculum. However at Post-16 there were limited opportunities. The local colleges were primarily focussed on the delivery of BTEC and other vocational qualifications. D&T was offered as an Advanced level (A-level) in all of the seven 11-18 schools in the city, but numbers often prohibited combinations of subjects and although the uptake of D&T at Advanced Subsidiary (AS) level had grown in the city, it was also the case that many students dropped the subject after AS.

Also, the twenty 11-16 schools in Sheffield suffered from much lower staying-on rates post-16 than the south-west area of the city which is served by 11-18 schools, and from much lower progression to university. The history of underachievement amongst some boys, as presented by Willis (1977), still raises concerns (Younger and Warrington, 2005). Thirty years later the "working class jobs" have decreased and changed, so that the next generation need a technical training and aspirations. In response and after consultation with head-teachers across the city, the Sheffield Local Authority (LA) set up the scheme which has become known as the Post-16 Engineering Project.

The Post-16 Engineering Project

The aim of this pioneering project has been to encourage students to consider and have access to a future in engineering. The project is based upon students from across the city joining the post-16 (sixth form) at King Edward VII School (KES) to be taught for some of their post-16 studies at Sheffield Hallam University (SHU) in order to experience study in a university environment and to use facilities used by engineering students. In this way the project aims to widen participation and to address the issues of identity, a potentially important factor influencing students when they decide whether to apply for University, and when considering engineering as a future career path. (Matthew and Pritchard, 2008 and Gee, 2001). The development of the project is shown in Table 1.

Table 1. Sheffield Post-16 Engineering Project Time Line

2005-2006	Sheffield Local Authority plan to encourage more students to study and to enter engineering as a career. Planning meetings with Sheffield Hallam University (SHU) and King Edward VII School (KES) to design Post-16 Engineering Project.
Sept 2006 to June 2008	First cohort of students, from across Sheffield, enrol at King Edwards VII to study A levels Physics, Chemistry and D&T at SHU and Mathematics at KES.
Sept 2007 to June 2009	Second cohort of students, from across Sheffield, enrol at King Edwards VII to study A levels Physics and D&T at SHU and Chemistry and Mathematics at KES.
Sept 2008 (to June 2010)	First cohort of students, from across Sheffield, enrol at King Edward VII to study Advanced Engineering Diploma with two units studied at SHU.
Sept 2009 (to June 2011)	Second cohort of students, from across Sheffield, enrol at King Edward VII to study Advanced Engineering Diploma with two units studied at SHU.

The current paper describes how the Post-16 Engineering Project aims to introduce the students of the cohorts, shown in Table 1, to the community of practice of engineering through the curriculum and engineering enrichment activities (Wenger, 2000).

A-level students on the Post-16 Engineering Project

In 2006-07 the first A level cohort of 11 students joined the project and studied AS Maths at school, and AS D&T, Chemistry and Physics at Sheffield Hallam University. The pattern of study is shown in Figure 1.

YEAR 12

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
D&T	MATHS	MATHS	PHYSICS	CHEMISTRY	A.M.
D&T		EXTRA CURRIC	CHEMISTRY	PHYSICS	P.M.

Monday: SHU, Psalter Lane
Thursday and Friday: SHU, City Centre Campus
Tuesday a.m. and Wednesday: King Edward VII School

Figure 1. Pattern of AS study for first A level cohort on the Post-16 Engineering project.

Most post-16 institutions across the region timetable extra–curricular activities for Wednesday afternoon, so this was incorporated to ensure that there was time for the post-16 engineering students to meet other A level students and to feel part of the school community. Tuesday afternoon was identified as time for visits and enrichment activities.

Enrichment activities arranged for the A level students

- Industrial visits including Swann Morton and Advanced Manufacturing Park
- Work Experience
- Presentations from engineering staff
- Meetings with engineering undergraduate students
- Use of specialist engineering facilities.

Upon completion of the course the A level students were entitled to a £1000 bursary providing they progressed to study engineering at university or gained employment in the sector. Also they were guaranteed an interview at Sheffield Hallam University or the University of Sheffield on an engineering degree course of their choice.

The A2 course followed a similar format of studying Maths, D&T and Physics with time available for project work and engineering activities (Figure 2). Early evaluation by staff of the experience of the first A level cohort identified a number of changes were needed. In the second year of the Post-16 Engineering Project the timetable was arranged so that students studied Physics at university on two days of the week. They were also taught by two tutors on each of those days, to ensure that tutors saw the students more than once a week to facilitate handing in coursework, giving feedback and reinforcement of students' learning. This timetable change did involve the students travelling between university in the morning and school in the afternoon on two days of the week. For the second cohort of 8 students, who started their post-16 studies in 2007-08, the timetable allowed students to continue to study chemistry to A2.

YEAR 13 = A2

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
PHYSICS	MATHS	MATHS	D&T	PHYSICS	a.m.
ENGINEERING		EXTRA CURRIC	D&T	ENGINEERING	p.m.

Monday, Thursday and Friday a.m.: SHU
Tuesday a.m. and Wednesday, King Edward VII School

Figure 2. Pattern of A2 study for first A level cohort on the Post-16 Engineering project.

Staff identified that it was isolating for the students to study together for their entire timetable and they were also together as a form group. Therefore the second cohort studied their Mathematics and Chemistry at school, integrated into other teaching groups so that they would form friendships and work alongside students beyond the engineering group. This was an important factor to give the

students aspiration and challenge of working alongside some students achieving a higher level. The second cohort continued a full day at university for their D&T studies which supported the teaching and learning activities in that subject. However, only three students from this cohort continued their A2 studies as part of the Post-16 Engineering project. The others either took all their A levels in school, went to college or took an apprenticeship.

Challenges during early stages of the Post-16 Engineering Project

The project had not been without challenges. Most of the students came from schools that did not have a tradition of progression to sixth form schools and there was no history of a cohort of 16 year old students studying at university. To offset this, the project held induction sessions at the school in the summer term and the students were taken to Farnborough Air Show to allow them to meet each other and university staff.

Preparations were needed at the University to prepare for post-16 students to study within the University, including:

- Meetings of a steering group of staff from Local Authority, school and university to plan and monitor delivery of the project
- University staff CRB checks
- Enhanced risk assessments for practical work
- Students enrolled for use of IT and library facilities once parental/guardian permission was received, but not for a University Identity card.
- Links between University tutors and A level teachers who offered guidance on the teaching and assessment of the A level syllabi.
- University tutor, teaching on the project, appointed as coordinator between the University and the school.

The school also assigned a member of staff to be coordinator and ‘champion’ for the project. As well as teaching the students for D&T, he is the form tutor for the post-16 engineering students, has the understanding of the project and provides pastoral support required by the students. Additional challenges include arranging the timetable for the group within the other constraints faced by the school and the university.

Funding of the Post-16 Engineering Project

The Local Authority funded the school for an additional one day per week per subject area for liaison between school and university. Finance came from the following sources: Learning Skills Council funding to the sixth form, Objective One funding and the Technology Enhancement Programme (TEP) which is part of the Gatsby Charitable Foundation. SHU also supported the first year of the project through widening participation funds. Subsequently for the Engineering Diploma there is a contract between the school and SHU. Agreeing a contract and funding for the project is challenging because the resource per head for a post-16 student is less than for a higher education student.

Engineering Diploma Education in Sheffield

As part of the strategic planning and coordination of the 14-19 education provision, Sheffield Local Authority(LA) supported a successful city wide consortia bid to offer the engineering diploma from September 2008. Students from schools across Sheffield are able to access the Level 2 diploma through a delivery model that has been promoted by the Local Authority. For one day per week diploma students attend the Sheffield Engineering Centre and also spend 0.5 days per week at the designated lead school within their local quadrant of the city.

The Engineering Centre was established by the LA to fill the need for students aged 14-16 who wanted to pursue qualifications in engineering including: Young Apprenticeship, BTEC, NVQ and diploma. Previously schools were hampered by lack of equipment and staff technical knowledge, whereas the post-16 training providers lacked the necessary teaching skills to engage young learners.

By design, the Post-16 Engineering Project has been developed to deliver the L3 Advanced Engineering Diploma by building upon the partnership between King Edward VII School and SHU, established during the teaching of the A level cohorts. Hence another pathway to study engineering from 14-19 has been established within Sheffield.

Planning took place between the school and university, with input from the LA, to design the delivery of the Advanced Engineering Diploma to establish which units would be taught at university. The

students spend one day a week at university, studying two units, with all other units taught in school. In addition the students have carried out mechanical testing of materials in the Engineering Department at SHU to support delivery in school of Unit 3: Selection and Application of Engineering Materials. The Additional or Specialist Learning (ASL) taken by the students is A level Mathematics. As part of the Year 13 delivery a SHU D&T Education student is placed in the school for teaching practice. This university student can liaise with university staff to support the Engineering Diploma students to use university facilities and equipment as part of the Project component of their Diploma.

During the summer between Y12 and Y13 eleven students from the first cohort completed work experience. Four went to Austria as part of an EC Leonardo Exchange programme to companies including BOSCH. This link continues in 2010. Five students went to Newburgh Engineering in Sheffield and two found their own placements.

Evaluation of the Post-16 Engineering Project

The academic performance of the students is monitored through the normal school processes. In addition the authors are evaluating the delivery of the project to inform their future practice and as information for other educators. To obtain detailed information from the small populations to be surveyed, questionnaires were designed using a combination questions requiring ranked response and open questions to allow spontaneous responses (Trochim, 2006).

Evaluation of A level Student Feedback

Contact was re-established with ten of the original 19 A level students. Seven completed questionnaires. Inevitably nil returns tend to bias the responses to positively engaged students. Students joined the Project from six schools across the city with only two students from King Edward VII school. Most students had heard about the project either through post-16 "options" evenings or school presentations. The responses to other questions are presented in Appendix B.

Responses to Question 1 indicate that the most important factor for these students, when choosing to study their A levels on the Post-16 Engineering project, was the opportunity to study at university. This is consistent with their responses that all but two had decided while doing their GCSEs that they wanted to go to university. Students differed in the factors that they like most about studying at school and university (Qn. 2), although the opportunity to use specialist facilities was the most common reason. The students found the visits to industry and work experience the most useful enrichment activities (Qn.3).

Question 4 reveals challenges for the students. The student who commented on the lack of chance to integrate with other A level students was in the first cohort. Timetable changes for the second cohort allowed more socialisation. However this did involve students moving between sites a few times a week, and the comment about this challenge is from a student in the second cohort. The students gave examples of how the skills learnt during their A level studies have been useful (Qn. 5) and highlight the usefulness of their mathematical and report writing skills. These students have progressed to a variety of engineering and science courses at University (Qn. 6), and reported on what they enjoy most about these courses (Qn. 7).

Evaluation of Engineering Diploma Student Feedback

Completed questionnaires were received from 11 out of 13 Engineering Diploma students, who joined the host school from at least 7 other schools across the city. Their responses are summarised in Appendix C. For all of these students the most important reason for choosing this route is the opportunity to pursue a career in engineering (Qn. 1), with the opportunity to study at University and to use specialist facilities the second most common reason. This is a contrast to the A level students (for whom the chance to study at University was most important) and seems consistent for the group of students at whom the Diploma is aimed. The students give different factors that they like most about studying at school and university (Qn. 2). Question 3 shows the very positive response of the students to the visits and work experience that have been included to introduce the students to the engineering community of practice. From the responses to Question 4 the authors can see that more explanation about the structure of the Diploma and coordination of the coursework deadlines is needed. The students have identified the development of their skills (Qn. 5) and are considering future career paths (Qn. 6).

Advanced Engineering Diploma Unit 2: Computer Aided Design for Engineering

A short case study is presented describing the rationale and delivery of a Unit for which the students have given positive feedback (Appendix C, Qn5). The University tutor developed the content and context of Unit 2 after consulting the diploma specification. He found the scenarios and contexts poorly matched and the range of assessment extensive which did not link together making the module on the surface seem very fragmented.

After conducting research on the student group, considering factors such as feeder schools and gender, the tutor realised after meeting the students and knowing the curricula they had experienced, that they would need an engaging, challenging experience that increased in complexity in a steady logical way. The idea was engagement first and fundamentals later, as the students had no experience of level two learning in the diploma area. This presented students with a steep learning curve and the challenge of developing this subject knowledge in a very short period of time. The tutor has contacts in industry, from his role as a Design Technology Teacher Trainer and previous experience as a classroom teacher.

The aim was to set Unit 2 in the industry of the engineering community into which, hopefully, these students will eventually move. The tutor liaised with Hope Technologies who manufacture high end mountain bike components and he considers the managing director is an ambassador for engineering in this country. The company designs, makes, manufactures and distributes a vast majority from the UK and has a factory overseas becoming one of the global leaders in their niche field of engineering.

The tutor started the Unit by conducting a visit to the company. This covered all the aspects of research design/manufacture etc and the students got a tour and opportunity to ask questions, to observe success and practising CAD designers in action within the engineering industry in the UK. This set the context and also raised the aspiration of the students.

The module assignments were based on the company products and similar processes and techniques were used by the students in university, where they conducted presentations, designed products and used advanced manufacturing techniques such as Rapid Prototyping.

Two hours a week at the University for this Unit necessitated an almost distance learning approach to maintain contact and engagement with the students. This did prove difficult in terms of delivery and the tutor developed e-learning resources to support the Unit. He considers this worked because media such as virtual learning environments, video tutorials and wikis were used, all relevant contemporary practice, well suited to generation Y learners (Cheese, 2008). The tutor used these strategies because he feels engineering education can and should be modern, fast paced, challenging, engaging, relevant and at the cutting edge of technology and wanted to inspire this future generation of innovators. The students' marks and high level of engagement with the Unit confirmed the success of the teaching and learning strategies used. The students' feedback in the questionnaire is positive (Appendix C, Qn. 5).

A questionnaire has been used to gather views of 7 staff about their experiences of teaching the Engineering Diploma and comparisons, if any, with teaching equivalent A level subjects. Headlines are that all staff noted that the Diploma students have better group work skills, but a lower level of mathematical and problem solving skills.

Conclusions

Has the Post-16 Engineering project inspired students to study engineering?

The experience of the A level students indicates that the project has enabled, and hopefully encouraged, some students to study engineering related subjects to Level 3 and beyond. However it is not possible with the small numbers involved to know whether these students would have chosen to study engineering had they studied A levels only in school.

How can the Engineering Diploma inspire the next generation of engineers?

The student responses show that these students chose the diploma in order to pursue a career in engineering. They, as did the A level students, are experiencing the community of practice of engineering through industrial visits, work experience and the university engineering environment. However it will not be suitable for all Engineering Diploma students to study engineering at university. The design of the diploma qualification does allow the students to progress to other qualifications at post-16, and to enter the engineering industry where technical skills are needed.

What lessons are there for educators to learn from the project?

Appropriate informed advice and guidance needs to be available for L2 Engineering Diploma students, as it will not necessarily be suitable for all to progress to study the L3 Advanced Engineering Diploma. Most L2 diploma students want a practical and vocational BTEC route at college, rather than the academic route through school sixth forms. In Sheffield the schools with sixth forms do not offer the L2 diplomas. Therefore students who have studied the L2 diploma are more likely to choose post-16 study with their contemporaries at a Further Education college. The influences of identity and community are strong when these decisions are made.

From this Post-16 Engineering project we are learning how teaching and learning strategies and enhancement activities can have a positive effect on the students' engagement and experience of the engineering community. At this early stage of delivery of the Engineering Diploma further evaluation of this project and of the wider experience of diploma students will be required.

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Appendix A: **The Structure and Equivalence of the new L2 and L3 Diploma qualifications**

The tables are extracted from the website of Edexcel, a UK awarding body offering academic and vocational qualifications. (Edexcel, Types of Diploma, 2010)

Level 2: The Higher Diploma is equivalent to 7 GCSEs at grades A* to C. (GLH = guided learning hours)

Principal Learning 50% Applied Learning (420 GLH)	**Generic Learning** Functional skills: English, Maths, ICT (80 GLH) Project (60 GLH) 10 days' work experience	**Additional & Specialist Learning** (180 GLH minimum, but up to 270 GLH)
Personal, learning and thinking skills (60 GLH)		

Level 3: The Advanced Diploma is equivalent to 3.5 A levels.

Principal Learning 50% Applied Learning (540 GLH)	**Generic Learning** Functional skills: English, Maths, ICT (0 GLH) Extended Project (120 GLH) 10 days' work experience	**Additional & Specialist Learning** (360 GLH minimum, but up to 540 GLH)
Personal, learning and thinking skills (60 GLH)		

The **Progression Diploma**, which comprises the Principal Learning and Generic Learning element of the Advanced Diploma, does not require the Additional and Specialist Learning component. The Progression Diploma is equivalent to 2.5 A levels.

Appendix B: **Summary of Feedback from A level students**

Q1. Reason for choosing to study on Post-16 engineering course? 1 most important, 5 least important.	mean	std.dev.	mode
Opportunity to find out more about engineering	2.85	1.21	4
The chance to use specialist facilities	2.57	1.27	3
The opportunity to study at University	2.14	1.07	2
The opportunity to qualify for a £1000 bursary	2.50	1.05	3
Other reason, please specify "I believed I'd be good at it"	3.67	2.31	5
Q2. What did you like about studying A levels at school and at University? 1 liked most, 5 liked least.			
Use of specialist technologies, e.g. rapid prototyping	2.14	1.68	1
Use of specialist laboratories	3.29	1.70	2
Working with subject specialist staff, tutors and technicians	3.29	1.38	4
The University environment	3.29	1.37	2
Library facilities	3.67	1.37	3.5
Computer facilities	2.86	1.07	3

Q3. How useful did you find engineering enrichment activities in which you participated? 1 most useful, 5 least useful			
Visits to industry e.g. Swann Morton, JCB, Advanced Manufacturing Park	2.00	1.55	1
Visits to specialist facilities, e.g. Testing equipment, electron microscopes, semiconductor cleanroom	3.29	0.76	3
Work Placement with a company	2.00	1.73	1
Talks from University engineering staff	3.00	0.82	3
Lunch with final year engineering students	3.57	2.00	4

Q4. What did you find most challenging about your A level studies?

	Number	Representative Comments from Students
Course structure	3	*3 hour blocks of one subject is too much/ no chance to meet and socialise with other A level students*
Course Identity	2	
Subject homework		
Subject coursework	1	
Tests and exams		
Time management	3	
Studying at different sites	2	*Study time lost travelling between sites*

Q5. In the work and/or studies you have undertaken since completing your A levels, please indicate any skills you gained or experiences that you had during your A level studies, that have been helpful to you

Group work	*Helped with degree level group assignments*
Project work	*Helped with writing university assignments, time management and project structure.*
Problem solving	*Helps with assignments*
Mathematical skills	*Helps with university engineering maths modules x 5*
Work experience	*Helps with applying for placement and jobs. Engineering environment*
Report writing	*Good grounding for further studies x 7*
Oral Presentations	*Helps with group assignments*
Design work	*Helps with creative assignments and portfolio x 2*
Computer aided design	*Will be useful for future career x3*
Visits to engineering companies	*Good industrial experience x4*

Q6. Please describe the route you have taken since completing your A levels, i.e where you are working and/or where you are studying.

Materials science and engineering masters, Chemical Physics, Automatic Control and Systems Engineering, Mechanical Engineering, Civil Engineering, Aerospace Technology, Product Design

Q7. What do you enjoy about your current course / employment?

Future career prospects/ challenging course content/ Student life/ CAD

Appendix C : **Summary of Feedback from Engineering Diploma students**

Q1. Reason for choosing to study Engineering Diploma. 1 most important, 5 least important.	mean	std.dev.	mode
Opportunity to pursue a career in engineering	1	0	1
Opportunity to study on the diploma	3.82	0.75	4
The opportunity to study at University to use specialist facilities	2.45	0.52	2
The opportunity to study an alternative qualification to A levels	3	0.77	3
Other reason, please specify / *"It's what I am good at"*	3.5	2.12	3
Q2. What do you enjoy about studying the Diploma at school and at University? 1 liked most, 5 liked least.			
Use of specialist technologies, e.g. rapid prototyping	2.8	1.81	2
Use of specialist laboratories	2.89	1.27	2
Working with subject specialist staff, tutors and technicians	2.2	1.03	2
The University environment	3.1	1.79	1
Library facilities	4.5	1.18	5
Computer facilities	4.71	0.95	5

Q3. How useful did you find engineering enhancement activities in which you participated?

Enhancement	No.	Representative Student Comments
Visits to industry	5	*it showed how an engineering company works/ Very useful x 6*
Use of specialist facilities		*"..and the facilities at SHU are great"*
Work Placement with a company	4	*"My work placement was very very good and I loved it and it extended my knowledge of lathes" x 6*

Q4. What do you find most challenging about your Diploma studies?

Challenge	No.	Comments
Course structure	4	Confusion about unit structure
Course Identity	4	*Diploma not recognised by all universities*
Subject homework	2	
Subject coursework	5	*Lots of deadlines come up at the same time x 4*
Tests and exams	5	
Time management	5	
Studying at different sites	2	
Other	1	*Maths*

Q5. In the work and/or studies you have undertaken since staring your Diploma, please indicate any skills that have been helpful to you.

Group work	*Helped my social skills x 6*
Project work	*Very helpful x 6*

Problem Solving	*Gets you thinking like an engineer +4*
Mathematical skills	*Maths and science helped me to understand how things work...+5*
Work experience	*"Absolutely excellent!!!!" +5*
Report Writing	*Improved +5*
Oral Presentations	*Makes you a better speaker x 6*
Design work	*Makes you think more +6*
Computer Aided Design	*" Very useful experience, best part!" x 6*
Visits to engineering companies	*Gave a good insight into engineering/ helps for case studies +4*
Q6. Have you decided if you want to study engineering at University? If so why?	
7 Yes with reasons + 1 undecided	

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