2006 HSC Notes from the Marking Centre Design and Technology

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2006 HSC NOTES FROM THE MARKING CENTRE
DESIGN AND TECHNOLOGY

Introduction

This document has been produced for the teachers and candidates of the Stage 6 course in Design and Technology. It provides comments with regard to responses to the 2006 Higher School Certificate examination, indicating the quality of candidate responses and highlighting the relative strengths and weaknesses of the candidature in each section and each question.

This document should be read along with the relevant syllabus, the 2006 Higher School Certificate examination, the marking guidelines and other support documents that have been developed by the Board of Studies to assist in the teaching and learning of Design and Technology.

General Comments

Teachers and candidates should be aware that examiners may ask questions that address the syllabus outcomes in a manner that requires candidates to respond by integrating their knowledge, understanding and skills developed through studying the course. This reflects the fact that the knowledge, understanding and skills developed through the study of discrete sections should accumulate to a more comprehensive understanding than may be described in each section separately.

Major Design Project

General Comments

Projects presented in 2006 represented a broad range of technologies and showcased the wide range of skills and abilities of the candidates.

Candidates demonstrated a clear understanding of the Major Design Project and the marking guidelines. It has become evident that the candidates' familiarity with the marking guidelines has enabled them to structure their folios in a variety of ways in order to address the course outcomes.

Candidates have become more aware of the processes of design development, from needs analysis to final evaluation and including the processes of production. The better responses identified a genuine need rather than just stating a final outcome for the project.

The issue of outsourcing of project-related processes and components is becoming an increasing concern. Outsourcing may be necessary if the candidate is unable to complete the required task at school, but it should not become an essential or major component of the project. Those candidates who tend to outsource the bulk of their project are not demonstrating syllabus outcomes in this regard. In the documents published early in 2006 'HSC Assessments and Submitted Works – Advice to Students' and 'HSC Assessments and Submitted Works – A Guide for Teachers', information is given describing accepted procedures for candidates with regard to outsourced work.

Another issue of concern is that of work completed 'off-site'. It is the intended spirit of the syllabus that work be completed within the school environment (see also BOS 22/04 – Official Notice).

Some projects and folios used or displayed practices that indicate students may not understand OHS requirements. Attention is drawn to Section 9.3.1.1 of the Board's Assessment Certificate and Examination (ACE) Manual regarding Health and Safety Issues in the development and selection of student projects, major works, bodies of work, exhibition and performance.

Increasingly, methods of communication such as digital images and multimedia presentations are being used to convey information to the HSC markers. Typically, the most successful Major Design Projects show development by models, scale models, hypothetical tests of concepts and design ideas, in addition to a strong and applied evaluation of the overall project. Better projects provided succinct summaries of their research, and demonstrated application of the results of that research. They also provided succinct, less detailed portfolios and provided real evidence of how they developed solutions to identified needs. Candidates are reminded that relevance of research and information is more important than providing extensive, irrelevant documentation. Many of the better projects were innovative and demonstrated ongoing resolution of design problems in order to achieve a design solution. Candidates should be encouraged to use real evidence of development in model or prototyping form, photographic or brief video evidence where appropriate, and to summarise conclusions and place the source material within an appendix.

Multimedia projects have become more popular and candidates are reminded that for projects of this nature it is important that the folio demonstrate the development of these projects. The better projects documented the evolution of the project, rather than simply providing the marker with a working model.

Component – Project Proposal and Project Management

Better responses indicated that the candidate had initiated research early and spent time clearly identifying and exploring the need to be addressed in their project. Weaker responses tended to discuss or simply state what it was that the candidate wanted to make rather than providing a thorough investigation of a problem, situation, want or need.

In the weaker responses it has become obvious that the proposal and planning section of the folio is finalised AFTER the project is complete and in so doing does not allow the candidate to demonstrate the evolution of the development process.

Assessment Criteria

Identification and exploration of the need
Better responses demonstrated the application of critical analysis skills to the investigation of the need and drew conclusions regarding their criteria for evaluation. The flow from need identification to the development of evaluative criteria provided candidates with focus and direction for the product, system or environment's development. Poorer responses tended to simply state what they proposed to make without identifying a genuine need and subsequently exploring opportunities for other solutions.

Areas of investigation
Better responses included a detailed analysis of the range of logical and relevant areas that they could possibly research, and the methodologies to be used, to inform the development of the product, system or environment, rather than listing some broad areas which may be considered in future research.

Criteria to evaluate success

The better responses considered the project proposal and the needs that the product, system or environment should meet, in many cases creating an assessment tool for use in the final evaluation of the success or otherwise of the product, system or environment. Better responses linked this work to an analysis of the functional and aesthetic aspects of design. Weaker responses tended to list the criteria without any analysis.

Action, time and finance plans and their application

Better responses used the action plan as an ongoing tool for assessment of progress and found it a management tool to help them achieve success. They frequently referred to it during the process and evaluated it regularly giving a self-evaluation of progress.

Some timelines that were presented clearly did not give specific details relevant to the project. Candidates need to add headings and stages that are relevant to their project in order to make it a well-formulated and useful management tool. Candidates need to develop their own timeline, specific to their project and themselves. It was often evident that many candidates completed the generic template after the completion of the project, thereby presenting a very obvious false representation.

Better responses had clear project management strategies applied, with quality action plans in place from the commencement of the project, and evaluated throughout its development.

Finance planning is often quite poor and not a demonstration of actual planning, rather a documentation and listing of costs. Many candidates listed their source of income with a well-justified reason for the amount of money they allocated to their project. Many provided receipts to demonstrate all expenses. Better responses demonstrated a genuine effort to develop a budget based on available financial resources and likely costs and expenses. Poorer responses were simply a collection of receipts after the event with no real evidence of financial planning or management. Little ongoing evaluation was evident with these projects. Hence, few justified financial decisions were made throughout.

Aspects of development and realisation, investigation and experimentation, prototype development, production, implementation and evaluation should be built into the process of planning. Candidates should be advised that it is appropriate to develop a plan of action, provide this and then evaluate this document during the project development to show new directions that may arise. It may be necessary to deviate from this plan and it is then appropriate to document variations that may occur. It is essential, however, that the original documentation, written at the commencement of the project, remains as evidence of its early development.

Selection and use of ideas and resources

Better projects identified resources that may be available to be used for the project and its development, then evaluated these resources and selected from the range. This selection of resources is part of project management, and was appropriately documented at this point. Many candidates used a table to succinctly communicate in this section. Better responses used this action as a link to the identification and justification of resources utilised in the major design project.

Candidates were better able to demonstrate their understanding and application of design processes when they communicated the development of their design project in its natural order, rather than artificially structuring it to fit a series of headings. Candidates who merely listed the marking criteria as subheadings in their folio without the necessary information have not demonstrated the evolution of the project.

Component – Project Development and Realisation

In this section, the development and realisation of the Major Design Project, the folio and product, system or environment, should be clearly evidenced and explained. Application of the conclusions of research should be evident in the development. This is best shown by models, scale and not-to-scale, made of a range of materials, simulations and, where appropriate, photographic evidence or similar. The development and the results should be clear in the final product, system or environment. Some more successful projects presented a 3D folio, where design development was evident by providing samples of modelled solutions. Lengthy written discussions that include large sections of information that is irrelevant to the project or this section of the folio do not assist students.

Better responses demonstrated an ability to critically assess existing designs and research relevant areas, which ultimately impact on the success of their final project. They were able to distinguish between relevant and irrelevant research. They analysed their findings and conducted relevant tests and experiments, which ultimately impacted positively on their end result.

Poorer responses demonstrated little design development. The final design was shown immediately without any research and investigation into existing designs. They often included irrelevant testing, which unfortunately rarely had an impact on the final project. Many did not distinguish materials, tools and techniques. In many instances, tools were described but very few actually tested. Some candidates listed tests and experiments without evidence of ever carrying them out.

Assessment Criteria

Evidence of creativity – ideas generation, degree of difference and exploration of existing ideas
This aspect was well understood by candidates. Many demonstrated a thorough understanding of a definition of innovation versus invention. A degree of difference in the ideas, technology use and/or final design was an acceptable indicator of these outcomes.

Consideration of design factors relevant to the Major Design Project
Though the design factors are explicitly listed in the syllabus, many candidates could not relate these factors directly to their project. Candidates tended to list these factors and write a description of them rather than relate them to the product, system or environment they were developing. Better responses addressed these factors by actually considering them in context rather than listing them in isolation.

Documentation of research, experimentation and testing of design ideas, materials, tools and techniques
The best responses referred to the use of relevant and appropriate testing and created a broad range of model solutions to inform the design development. These responses drew their conclusions explicitly, which ultimately impacted positively on their product, system or environment, with the evidence of the impact being annotated in the product, system or environment. Weaker responses tested and experimented unnecessarily then provided extensive, irrelevant documentation.

Research that can be extracted from external and well respected sources can be referenced or summarised in projects, but should not simply be downloaded and duplicated by candidates.

Application of conclusions

Those candidates who carried out relevant developmental processes did very well in providing evidence of their application of the conclusions drawn to their product, system or environment.

Identification and justification of ideas and resources

The justification of the selection of the ideas and resources used remains a concept that is not well understood. Better responses identified the resources used in the major design project and justified their application and value, while weaker responses just listed the resources used.

Evidence of the testing of design solutions and application of conclusions

Many responses showed no evidence of a process of a prototype or model, digital 3D modelling or mock-up development. Processes of development such as this enable candidates to demonstrate both the testing of solutions to design challenges that they meet as they progress, and the testing of whole concepts.

Use of communication and presentation techniques

A broad range of technologies was used in the presentation of all aspects of product, systems and environment development. From written text to multimedia presentations, excellent use of the internet for research and person-to-person communication, candidates showed a growth in the range of techniques they could apply appropriately.

Evidence and application of practical skills to produce a quality project

Successful projects demonstrated production of work at the highest technical level. This was evident in many products, systems and environments, and in a growing range of technologies. Many of the better responses tended to communicate their construction phase through the use of photographs, which outlined them completing various phases. Explicit instructions followed these photographs along with ongoing evaluations. This enabled the markers to identify that the candidates were clearly solving ongoing problems and making relevant decisions.

Better responses showed little use of outsourcing and the outsourcing they had used was well justified. The majority of the product, system or environment was completed by them, demonstrating that they had developed many new skills and managed their time in an effective way.

Consideration of the practices in industrial/commercial settings as they relate to the Major Design Project

Better responses clearly demonstrated an understanding that the 'practices' referred to by the guidelines are the practices of both designing and producing. They discussed the whole process from needs identification through to production and compared their own practice with that of practicing designers and producers.

Poorer responses generally named an industrial or commercial setting, and then failed to compare and contrast these processes with their own. In many instances this was a speculative comparison rather than a factual link to industrial/commercial settings. By evaluating the design, management and production techniques in these settings, the candidate is able to demonstrate a sound knowledge of the industrial and commercial practices along with their own.

Component – Project Evaluation

Ongoing evaluation was again much stronger throughout folios. Many projects demonstrated ongoing problem-solving and decision-making processes by drawing conclusions back to how it would impact on their final product, system or environment. Many of these candidates referred back to their criteria to evaluate success as a guide to this development.

The better responses were thorough in relating their evaluation, both ongoing and final, to their project proposal work.

Final evaluation in relation to functional and aesthetic criteria was generally strong. The better responses included a photo of the final product, system or environment in its environment, for example, showing the successful operation of it or perhaps modelling it. This demonstrated that there was a significant link between the final product, system or environment and the Project Proposal that was initially set by the candidate.

The final evaluation of the product, system or environment's impact on society and the environment continues to provide challenges for candidates.

Evaluation of impact on society remains an overall, weaker area. The better responses linked back to current trends in design. They discussed the uses of their product, system or environment and where it is going.

There was a stronger use of professional evaluations, but many responses failed to link such evaluations to how their project impacted on society as a whole. Many tended to include these evaluations without realising their significance or reflecting upon it.

In relation to evaluating environmental considerations, the best responses consistently discussed recycling issues with a detailed analysis. They clearly stated what impact their design had on the environment in terms of resource usage.

Assessment Criteria

Recording and application of evaluation procedures throughout the design project
The better responses recorded evaluative comments and procedures as they occurred. Better projects used incidental pages or notes throughout the folio or attached to their models of design development to emphasise their efforts at evaluation. The presentation of developing models and prototypes communicates clearly to markers that ongoing evaluation has occurred.

Analysis and evaluation of functional and aesthetic aspects of design
Better projects commenced this analysis in the early stages of development. They analysed functional and aesthetic criteria while developing their criteria to evaluate success. They then drew upon this in a final evaluation of their solution using functional and aesthetic criteria.

Final evaluation with respect to the project proposal and the project's impact on society and the environment
Societal impact still proves to be an area of evaluation that is difficult for many candidates. Environmental issues are better addressed, but rarely extend to life-cycle assessments of materials or of environmental impact of processes used. Successful projects related their criteria to evaluate success directly to their final evaluation.

Relationship of the final product, system or environment to the project proposal
Better candidates provided a brief personal reflection relating back to the criteria to evaluate success. Weaker responses failed to draw a parallel between the product, system or environment and the criteria for success established in the project proposal.

Written Examination

Section I – Multiple Choice
This section is mandatory for all candidates.

Question Number	Correct Response
1	C
2	A
3	A
4	C
5	D
6	C
7	B
8	A
9	D
10	C

Section II

This section is mandatory for all candidates.

Question 11

(a)(i) Most candidates were able to competently identify two or more applications of biometrics, including reduction in terrorism, authenticating identity and applications regarding security and employment identification. Better responses used the stimulus to generate additional applications not already mentioned within the stimulus material eg security at airports and credit card security. Weaker responses relied solely on the applications presented in the stimulus material, eg iris and fingerprint recognition.

(ii) The majority of candidates identified and indicated the main features for two advantages of technology used in identity management. Better responses directly linked the advantages to the identified technology. Weaker responses only identified one advantage, at times demonstrating a limited connection to the nominated technology.

(iii) Most candidates identified possible impacts of biometrics on society. The better responses explained the impacts by establishing a clear relationship between the use of biometrics and the consequential effect on society. Weaker responses listed a range of possible impacts with limited links to societal impact.

(b) Most responses demonstrated why and /or how designers consider cultural diversity in the development of new technologies. Most candidates were able to describe some responsibilities of designers in regard to cultural diversity; however, the majority focused solely on the area of ethnicity.

Better responses identified several responsibilities of designers when considering cultural diversity, with a link to new technologies, and provided a specific example in support of their explanation. Their understanding of cultural diversity was broader, including issues such as sustainability, green ethos, age and religious influences.

Weaker responses simply outlined a responsibility of a designer, often neglecting to consider cultural diversity or cultural diversity was mentioned but provided no relationship to the designer. Many did not include any reference to the development of new technologies.

(c)   The majority of candidates were able to identify some societal changes coupled with some relevant impact on technology.

The better responses clearly demonstrated a strong relationship between societal changes and the resulting impacts upon the use of technology. These responses used relevant examples from the stimulus material and /or other technologies: eg society's demand for instant communication hence developments in facsimile, email and mobile communications technology; or societal changes towards environmental concerns and therefore technologies developed with recyclability and sustainability in mind.

Weaker responses often made reference to how technology has affected society, rather than societal changes affecting technology. Most candidates could outline a change in society but neglected to discuss the impact such a change had on the use of biometrics or other technologies.

Section III

Question 12
Candidates who selected this question were able to demonstrate a good understanding of the process from an industrial/commercial perspective. They were able to adequately relate creative processes they knew about to those used in industrial/commercial settings.

(a)   The majority of candidates used the stimulus material to assist in answering the question. They managed a description of the process shown, demonstrating its relationship to industrial/commercial perspectives. They were also able to make specific links to examples. Better responses demonstrated an in-depth understanding of the steps in the process shown, and how they related to each other, using appropriate examples and their relationship to industrial/commercial settings.

Weaker responses were only able to identify aspects of the process without the use of examples.

(b)   Many candidates identified a design process as a creative process. Better candidates were able to draw out and relate the effectiveness of creative processes they were familiar with and those used in industrial/commercial settings, some providing examples to support their answer.

Weaker responses identified a link between creative processes with limited discussion of their effectiveness in industrial/commercial settings

Question 13
The majority of candidates utilised both the stimulus material provided and examples of their own to answer the question. The responses generally indicated a good understanding of factors leading

to the successful development of technology and management strategies used in design and production.

(a)   Most candidates were able to list a number of factors that led to the development of new technologies with some link to the impact on society.

Better responses recognised and named factors leading to the development of new technologies and how these relate to cause and effect on society. Some were able to extrapolate the technologies used in the stimulus material and base their explanation of the social impact on these technologies. They were also able to include factors other than functional factors in their responses.

Weaker responses identified a limited number of factors with minimal impacts on society.

(b)   The majority of candidates outlined, some describing in depth, a range of management strategies and their relationship to the development of new technologies.

Better responses demonstrated a very good understanding of management strategies through recognising individual strategies and how they combine to successfully develop new technologies. These responses were able to analyse how the management strategies they utilised in their MDP were related to those used in the development of new technologies through a thorough comparative analysis.

Weaker responses were able to identify some management strategies used in designing and producing with a weak or limited link to the development of technology.

Question 14
The majority of candidates who selected this question utilised the stimulus material supplied to demonstrate a broad understanding of life cycle analysis (complemented with examples of their own) as the basis for ethical and environmental decisions made by designers.

(a)   The majority of candidates referred to the products provided by the stimulus material. Most candidates chose two or more products to discuss in their response.

Better responses clearly explained the reasons for redesign based on a life cycle analysis using specific examples, which may have included materials, environmental impact and sustainability issues.

Weaker responses often provided a description of each product but did not identify the link to redesigning a product and a life cycle analysis.

(b)   Most candidates were able to demonstrate a sound knowledge of environmental decisions, but provided limited understanding of ethical decisions made by designers, after undertaking a life cycle analysis.

Better responses related both ethical and environmental decisions made by a designer to the implications arising from undertaking a life cycle analysis. These candidates also demonstrated a high level of understanding through the use of relevant examples. Better responses for ethics may have included discussion of intellectual property, sustainability of resources for future generations, OHS for workers and the use of third world labour for expensive products.

Weaker responses did not use examples to demonstrate any relationship or implications of conducting a life cycle analysis, or limited their discussion to environmental issues without reference to a life cycle analysis.

Design and Technology
2006 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I			
1	1	Communication	H5.2
2	1	Factors Affecting Design	H1.1
3	1	Needs Analysis	H4.1
4	1	Environmental Impact	H2.2
5	1	Sustainability	H1.1
6	1	Safety and Responsibility	H4.2
7	1	Factors Affecting Design	H1.1
8	1	Success of Innovation	H3.1
9	1	Trends in Society	H2.1
10	1	Responsibilities of Designers	H2.2
Section II			
11 (a) (i)	2	Global, Social, Political Influences on Designing and Producing	H2.1
11 (a) (ii)	3	Trends in Society	H2.1, H2.2
11 (a) (iii)	2	Issues Arising from Trends	H2.1
11 (b)	3	Impact on Society	H2.1, H2.2
11 (c)	5	Impact on Society	H2.1
Section III			
12 (a)	6	Industrial and Commercial Practices	H6.1
12 (b)	9	Creative Processes	H3.2
13 (a)	6	Impact of New Technologies	H6.2
13 (b)	9	Project Management	H5.1
14 (a)	6	Life Cycle Analysis	H1.1
14 (b)	9	Ethical and Environmental Issues	H2.2
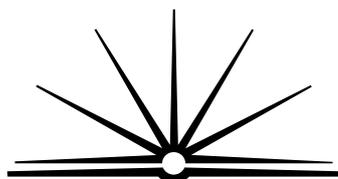
2006 HSC Design and Technology Marking Guidelines

Section II

Question 11 (a) (i)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Recognises and names more than ONE application of biometrics	2
• Recognises and names ONE application of biometrics	1

Question 11 (a) (ii)

Outcomes assessed: H2.1, H2.2

MARKING GUIDELINES

Criteria	Marks
• Sketches in general terms more than ONE advantage of one form of technology used in identity management	2
• Identifies ONE advantage of one form of technology in identity management	1

Question 11 (a) (iii)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Make the relationships between the impact of biometrics and society evident AND • Relate the cause and effect of biometrics to society	3
• Describes the possible impacts of biometrics on society	2
• Outlines an impact of biometrics with limited link to society	1

Question 11 (b)

Outcomes assessed: H2.1, H2.2

MARKING GUIDELINES

Criteria	Marks
• Relates responsibilities of designers to the development of new technologies and shows why and/or how designers consider cultural diversity	3
• Describes responsibilities of designers to cultural diversity when developing new technologies	2
• Outlines possible responsibilities of designers when considering cultural diversity	1

Question 11 (c)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Describes changes in society and provides points for and/or against the impact of these changes on the use of biometrics and/or other technologies	4–5
• Identifies changes in society with some discussion of their impact on the use of biometrics and/or other technologies	2–3
• Outlines a change in society with reference to uses of technology	1

Section III

Question 12 (a)

Outcomes assessed: H6.1

MARKING GUIDELINES

Criteria	Marks
• Makes the relationship between the steps of the process shown and relates this to an industrial and/or commercial perspective, with specific links to examples	5–6
• Describes the process shown, from an industrial and/or commercial perspective, making use of examples	3–4
• Outlines the main features of the process OR • Outlines related industrial or commercial practices	2
• Identifies an aspect of the process OR • Identifies an industrial or commercial practice	1

Question 12 (b)

Outcomes assessed: H3.2

MARKING GUIDELINES

Criteria	Marks
• Draws out and relates the effectiveness of creative processes and those used in industrial and/or commercial settings	8–9
• Explains the effectiveness of creative processes and those used in industrial and/or commercial settings	6–7
• Describes the effectiveness of creative processes and those used in industrial and/or commercial settings	4–5
• Outlines the effectiveness of creative processes and those used in industrial and/or commercial settings	2–3
• Identifies a link between a creative process and those used in industrial and/or commercial settings OR • Identifies a creative process	1

Question 13 (a)

Outcomes assessed: H6.2

MARKING GUIDELINES

Criteria	Marks
• Recognises and names the factors that lead to successful development of new technologies and relates the cause and effect of this impact on society, with specific links to examples from the stimulus material	5–6
• Recognises and names factors that lead to the successful development of new technologies and describes the impact of new technologies on society, using examples from the stimulus material	3–4
• Outlines the factors in successful design development and makes a link to the impact on society, with reference to at least one example	2
• Identifies a factor in design development with limited relationship to the impact on society OR • Identifies an aspect of the successful development of new technologies with limited relationship to the impact on society	1

Question 13 (b)

Outcomes assessed: H5.1

MARKING GUIDELINES

Criteria	Marks
• Draws out the relationship between management strategies used in designing and producing and relates these to the strategies used in the development of new technologies	8–9
• Explains management strategies used in designing and producing and relates these to the strategies used in the development of new technologies	6–7
• Describes management strategies used in designing and producing, demonstrating a link to the development of new technologies	4–5
• Outlines strategies used in designing and producing	2–3
• Identify a strategy used in designing and producing	1

Question 14 (a)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Makes the relationship between life cycle analysis and the impact it has on the redesign of products, demonstrating the why and/or how through use of the stimulus material	5–6
• Describes the relationship between life cycle analysis and the impact on product redesign, making use of the stimulus material	3–4
• Outlines life cycle analysis and the impact on product redesign	2
• Lists features of life cycle analysis	1

Question 14 (b)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Draws out and relates ethical and environmental decisions made by a designer to implications that result from undertaking a life cycle analysis	8–9
• Explains ethical and environmental decisions made by a designer as a result of undertaking a life cycle analysis	6–7
• Describes ethical and environmental decisions made by a designer as a result of undertaking a life cycle analysis	4–5
• Outlines ethical and/or environmental decisions made by a designer when considering a life cycle analysis	2–3
• Identifies an ethical and/or environmental decision made by a designer	1