Information Technology

2012 Chief Assessor's Report

Government of South Australia

SACE Board of SA

INFORMATION TECHNOLOGY

2012 CHIEF ASSESSOR'S REPORT

OVERVIEW

Chief Assessors' reports give an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, the quality of student performance, and any relevant statistical information.

SCHOOL ASSESSMENT

Assessment Type 1: Folio (20%)

From the subject outline:

> Assessments for the folio should cover the core topics and the option topics. There should be at least three folio assessments.
>
> Assessments may be presented in a range of forms, including case studies, essays on issues, oral presentations, multimedia presentations, tests, and websites.
>
> For this assessment type, students provide evidence of their learning primarily in relation to the following two assessment design criteria:
> - knowledge and understanding
> - analysis and evaluation.

Folio tasks this year were well supported with evidence of research. Through their case study of an information system, students were able to demonstrate clear understanding of the aims, outcomes, components, constraints, and feedback mechanisms in context. Students investigating individual information systems were able to demonstrate higher competencies against the performance standards compared to those students who investigated common class scenarios. Essays completed by students using a scenario-based focus scaffolded with restructured questions from past papers to meet the performance standards were given greater opportunity to demonstrate their abilities. Students who used a standard referencing system within their folio work were able to demonstrate highly effective communication across the assessment type.

It is important for teachers to ensure that folio tasks meet the requirement of the subject outline for the current year. The 2012 and 2013 Information Technology subject outline states on page 86: 'Assessments for the folio should cover both the core topics and the option topics'. Please refer to the Assessment Plan exemplars for guidance in relation to the coverage of topics.

Teachers who used open-ended tasks written to encompass the performance standards enabled students to demonstrate the assessment design criteria Knowledge, Understanding, and Analysis and Evaluation at a higher standard.

The performance standards must be used in assessing student work. 'Each level of achievement describes the knowledge, skills, and understanding that teachers and assessors refer to in deciding, on the basis of the evidence provided, how well a student has demonstrated his or her learning' (page 87). Teachers will make a decision about the quality of the student's learning by referring to the performance standards and assigning a grade between A+ and E− for the assessment type. Teachers are advised to annotate student work with performance standards indicators to provide valuable feedback for students to focus on and improve. This also significantly aids the verification through the moderation process.

Assessment Type 2: Skills and Applications Tasks (30%)

From the subject outline:

> Students undertake one skills and applications task for the option topic that includes a project. There should be two skills and applications tasks for the other option topic.
>
> Skills and applications tasks may be short or extended activities that are designed to enable students to apply and use information technology concepts with appropriate terminology. They apply skills, concepts, and complex processes to manipulate and process data to produce information technology systems.

See the Information Technology subject outline for more details.

Skills assessment tasks reflected a range of assessment activities conducted by students across the option topics. Analysis and development questions dominated the assessment items this year and it is recommended that teachers develop a range of questions that allow students to access the evaluation and validation areas of the performance standards. Balancing the assessment design criteria allowed students to approach all of the specific features and demonstrate their learning against the performance standards.

Teachers must ensure that task cover sheets showing the assessed specific features and performance standard grids accompany each assessment item. The indication of the specific features for individual tasks ensured that students were able to align the requirements of the performance standards against the criteria of the question. It is vital that teachers include a set of solutions to enable moderators to verify performance standards and where grade bands have been awarded.

A suggestion for the development of tasks is that they could include a series of questions around a single theme or scenario. Students performed at a higher standard when questions were constructed to contain several subparts around a common theme or scenario. Within an assessment item, a student may be asked to answer constructed questions to access a range of specific features to display evidence of learning. Teachers must mark against the performance standards, and while the mark sheets used in previous years can be used as a guide, appropriate

assessment rubrics should accompany tasks to enable students to present evidence against the performance standards.

Time allocation for individual tasks varied across schools from two lessons under supervision compared with three or more lessons with limited supervision and homework time in another. Teachers are recommended to use the examination as an indication level for 2 hours of assessment work under supervision. The Learning Assessment Plans that are published on the SACE Website can be used as a guide in relation to assessment conditions regarding time and supervision constraints.

Students performed at a higher standard with well-constructed tasks that were guided, with openness for possible answers or pathways to solutions, and not lock-stepped. The ability for students to answer programming topics in varying ways ensured teachers were able to identify students working at higher levels. Good programming assessment tasks incorporated nested constructs, looping, arrays, and a mixture of elements from the subject outline. Relational databases used outcomes to show a range of criteria (singular and multiple), grouping, sorting, and mathematical calculations. The ability to desk-check algorithms across all option topics involving coding provided evidence of validation of the outputs of an algorithm and allowed for teacher assessment of the specific features abbreviated as AE1, AE2, AE3, DV1, and DV3.

Teachers are reminded to utilise balanced assessment tasks to allow students to demonstrate performance and specific features in analysis, design, development, and validation. In the non-project option topic, students tended to be provided with two tasks that were sufficiently different. In assessment plans where the option topic was the subject of the project, an assessment only involving queries or desk-checks limited student performance.

Assessment Type 3: Project (20%)

From the subject outline:

> Students undertake a project that is developed on the option topic that includes one skills and applications task. The project must be an individual project.
>
> The project consists of the development of a test system, using representative data, and includes documentation. The solution should be portable and able to be validated on another computer. If this is not possible, other evidence that the solution works must be produced.
>
> Students apply the five stages of the systems development life cycle in designing and making a system: problem definition, analysis, design, development and validation, and evaluation.
>
> The following documentation must accompany the project:
> - a problem definition
> - an analysis of the problem
> - a design for the solution
> - a validation plan and evidence of validation of the elements of the system
> - an evaluation of the solution.

See the Information Technology 2013 subject outline for more details.

The documentation presented for moderation this year reflected a greater understanding of the systems development life cycle. Students were able to demonstrate proficiency through the incorporation of recommended practices and techniques. Relational databases used comprehensive data dictionaries and input masks and application programming demonstrated sound pseudocoding and structure charts. Multimedia projects were lacking in the annotation of storyboards and the development of algorithms for implementation. Students are advised to verify their algorithms through desk-checking as part of their design or validation.

When students are developing their outcomes for projects, it is advisable for teachers to ensure that there is diversity from student to student. Work presented from some schools used a common scenario and students presented work with guided outcomes that restricted their ability to demonstrate their ability against the higher bands of the performance standards. Students struggled to specify project outcomes that met the level of complexity required at Stage 2 and therefore allow their work to meet the performance standards at the higher levels. Teachers should ensure project outcomes are of an appropriate nature before students engage in the development of their projects. There should be appropriate data entry and then a number of broad outcomes that process data and output information. Each should be stated clearly as a single sentence under the heading of analysis.

Students are advised to clearly section their written documentation to show the five components of the systems development life cycle. Evidence presented by some students blurred the line between analysis and design, or validation and evaluation. Teachers should instruct students to use headings and subheadings to clearly identify the various sections of the major project and follow through the individual project outcomes.

EXTERNAL ASSESSMENT

Assessment Type 4: Examination (30%)

From the subject outline:

> Students undertake a 2-hour externally set and assessed examination that assesses the core topics and the option topics. The examination consists of short-answer questions and extended-response questions. Students may bring one unfolded A4 sheet (two sides) of handwritten notes to the examination.
>
> For this assessment type, students provide evidence of their learning in relation to the following assessment design criteria:
> - knowledge and understanding
> - analysis and evaluation.

See the 2013 Information Technology Subject Outline for more details.

Part A: Core Topics (Questions 1 to 4)

Question 1

The mean mark was 7.97/14 (57%).

The question is set to deliberately focus on an information system and the answer should be in terms of the aspects of the particular information system described in the scenario. In part (a), students explained people, hardware, software, and data well. However, very few students could explain a procedure with respect to the information system itself, with many inappropriately stating the steps involved in purchasing a ticket. Teachers are advised to give students more varied scenarios practising writing answers in terms of the information system.

For part (b), the aim was poorly stated by a number of students, using the term 'manage' inappropriately in many cases. There is a difference between the aim of the *business* and the aim of the *information system*.

When asked for data needed to inform customers in part (c), a majority of students did not include the customers' name.

Many students did not read in part (c)(ii) that the comedian became ill after last night's performance, and that the sale of a ticket the next day should not have been allowed to occur by an up-to-date information system.

Each year this report states that a statistical outcome involves grouping and numerical output for each one of the groups. It is considered essential that students understand what is necessary to produce information that is statistical by nature, as required by part (d).

Question 2

The mean mark was 10.89/22 (50%).

Students need to immediately think of calculations when they read the word 'process'. So when answering in part (a)(ii) that the digital display will display the drink selected, the money inserted, and the change required, the students should then be concentrating on the process to calculate the change in part (a)(iii).

In part (b), the question asked for understanding of why the instructions would be stored and not the properties of a particular storage medium (e.g. ROM).

In part (c)(i), students were asked why secondary storage is needed for the vending machine. So the answer needs to be in terms of the data for the vending machine and why this data is needed for the long term (rather than the strange reverse argument that it will be lost if it is not in secondary storage).

These questions were designed to allow students to customise their answer to the scenario presented (and hence meet the higher levels of the performance standards) and not just recite words from the two pages of notes that they are allowed to take in.

Question 3

The mean mark was 10.20/26 (39%).

Part (a) was poorly answered, with students not focusing on why the university would provide the facility and that, for Ella's computer to connect to the server, she would need to log in. Part (b) was answered well by many students.

In part (c), many students did not discuss access rights to particular folders/files, and instead discussed packet construction and sending these to an IP address.
Part (c)(ii) required the concept of data being broken into packets and then what is added to the packet and at what layer of TCP/IP. Part (d) required microwave as the medium being transmitted to a satellite.

Part (e), worth 5 marks in total, allowed students to demonstrate their knowledge of the changing transmission of packets across the internet. This is considered to be a core concept of how data travels from one computer to another, and teachers are advised that students should be able to demonstrate greater knowledge than just packets travel by the 'best path'. It was not evident with many students that they understood that packets belonging to the one file travel along different paths, or why.

In part (f), many students showed understanding that TCP creates the packets, but did not show understanding that TCP also receives them at the destination.

Question 4

The mean mark was 3.26/8 (41%).

Students who answered well mentioned that the company would need less storage space and/or less IT staff-hours, as they would not need to back up. Other students provided answers about needing extra security locally and needing extra backup — all of which would be provided by the company offering the cloud storage. When providing answers to this type of question, students are encouraged to consider cause and effect. Less storage/security would be needed locally, but this is compensated for by the storage and backup procedures that would need to be in place with the company providing the cloud storage. Less IT staff-hours would be needed locally, but the company providing the cloud storage would have increased IT staff-hours for extra clients they have. Students also need to think of the costs involved, as the service would not be provided free. Teachers are advised to provide students with opportunities to plan and discuss such scenarios involving actions and consequences. Facilities such as Dropbox and information available in 2012 about Google data centres provide students with this type of background.

Part B: Option Topics (Questions 5 to 9)

A surprising number of students this year attempted all of the option topics, although the instructions state that only *two* of the questions are to be chosen for answering. Students need to be discouraged from this practice.

Question 5

The mean mark was 10.33/25 (41%).

Part (a) was answered poorly. Students need to do more than quote the term 'data redundancy'. They need to point out what is being repeated unnecessarily. For example, although the date 5/10/12 appears twice in the table, this is not a case of data redundancy.

Unfortunately, many students omitted adding the two fields to the Cars table required in part (c)(i), thus wasting an easy mark. Students need to exercise more care. Some students tick questions as they complete them — a possible strategy.

As in other years, many students do not show understanding of what comprises a composite key. This is considered an essential component of relational database design at this level, and teachers are advised to provide students with more guidance as to how to choose these fields and what this achieves. Choosing the two foreign key fields (the primary key fields for the tables on each side) is unlikely to be the correct response.

Part (f) was not well answered, reflecting a lack of understanding of how to appropriately query a relational database system, as also seen in student projects at moderation. Some students drew vertical lines over the top of the lines provided to create a Query By Example (QBE) grid — sensibly. A number of students answered for 2012 (i.e. between 1/1/12 and 31/12/12) as a criterion, but the question asked for the *current* year relevant to whenever the query is asked. Students at this level need to be able to apply criteria that produce information based on the current data rather than producing a static list based on hard-wired criteria. The question also asked to sort the data, which many students skipped over. As stated earlier, students need to be careful when reading questions and to highlight critical words in the question. Teachers are advised to provide students with many practice questions and opportunities in assessment tasks to produce lists of information that are based around current date and time.

For part (g), many students discussed backups, firewalls, and antivirus and login systems, as they have practised these answers from past papers. However, the question asked for discussion about the ethical use of data. Teachers are advised to provide broader opportunities for students to practise writing about a range of issues in the social responsibility of the option topics.

Question 6

The mean mark was 11.33/25 (45%).

This question showed dramatic improvement from last year, to this year being the best-answered question of the option topics. Parts (a) to (d) were answered quite well in the main, although loop types, namely fixed, pre-test and post-test, need more consolidation.

Some students were challenged by writing code in parts (e) and (f).

Part (g) asked students to explain, so students need to do more than identify a practice or convention.

Question 7

The mean mark was 8.79/25 (35%).

Part (a) was answered reasonably well. Parts (b) and (e) required students to write code or pseudo-code and this saw students tending to struggle. As stated last year, it is essential that students are provided with opportunities to develop basic programming skills, which include generating random numbers, nested selection, iteration (looping), and using an array. One can expect that all of the programming topics will cover these vital aspects.

It is also expected in any of the programming-based option topics that students are able to follow through an algorithm the values that would be held in variables and to then write code to display the results or to answer what would be outputted from the code.

Question 8

The mean mark was 9.06/25 (36%).

In part (a), many students focused on the website's appearance rather than its functionality. This topic has a focus on programming constructs and teachers are advised to concentrate on the programming aspects rather than appearance.

Part (c), being a low-level algorithm/code question, was answered quite well. However, parts (d) and (e) were answered poorly, as students did not know about cookies or arrays, and, in calculating the total order, they gave the same answer as for part (c). To be equitable with the other programming topics, it is vital that students are able to develop code for multiple orders.

Part (g) was answered reasonably well, with students recognising that the photographer would have increased exposure and reduced costs, but perhaps less business in taking photos.

Question 9

The mean mark was 8.21/25 (33%).

This question was answered by a very small number of students and was answered poorly. In part (a), students were generally able to read the code and create a reasonable sketch.

In part (c), few students were able to answer this question correctly or seemed to understand what was required of them, which was to write an SQL (Structured Query Language) query. This is what this topic is primarily about — so if this topic is undertaken, it is imperative that students are provided with many opportunities to write SQL queries that extract data from the server-side database.

Few students answered parts (d) and (e) well, not understanding about server-side software, which again is a prime component of the topic. Few students were able to answer part (f) appropriately, as students focused more on having up-to-date prices rather than the actual website itself.

GENERAL COMMENTS

For the option topics, for students to achieve at the higher levels of the performance standards it is essential that they are provided with opportunities that involve multiple items, multiple customers, and multiple players. For example, the aim of a scoring/playing scenario would involve the storing of scores for each of the players. An outcome would be to calculate and display the score of the one player (which may be several shots, as in darts or ten-pin bowling). Another outcome might be to select a player from a list and show that player's results. Another outcome might be to show players with a result higher than a value entered by the user. A statistical outcome would be to display the result of each of the players. This scenario could apply to any of the programming topics.

The relational database topic has similar expectations. Data entry would be of the main transaction. A list could be based on one criterion, such as a player selected from a drop-down list. A list based on two criteria could be the players scoring more than a value (entered by the user) for the last twelve months, based on today's date. A statistical outcome would be to display the result of each of the players in the last (most recent) tournament.

The more often students are provided with opportunities to practise these concepts, the more likely they are to meet the higher levels of the performance standards.

Teachers can gain valuable experience by designing tasks and answers, participating in the development of appropriate material through the subject association and/or by participating in clarification meetings or assessment and moderation panels.

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