Information Technology Studies

2010 ASSESSMENT REPORT

Technology Learning Area

Government of South Australia

SACE Board of SA

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INFORMATION TECHNOLOGY STUDIES

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GENERAL COMMENTS

Student achievement in Information Technology Studies is assessed in four assessment components. Assessment Component 2: Skills Tasks and Assessment Component 3: Projects are centrally moderated, while Assessment Component 1: Course Work is statistically moderated against the externally marked Assessment Component 4: Examination.

For both skills tasks and projects, student work should reflect Learning Outcomes 1 and 3 (and 4 for projects) in order to demonstrate appropriate achievement. Regardless of the option topic and programming environment (for example, traditional programming or event-driven programming), any task or project should allow for manipulation and processing of data to produce outcomes involving complex processes. Successful student responses demonstrated procedures, sequencing, branching, and repetition (either program-activated or user-activated), so that, for example, a user is able to choose an item or action repeatedly. The program then processes data related to each choice, to produce an outcome such as how many attempts each player had, or what is the total cost per item.

At Stage 2 level, students who presented work at the higher end of the scale had been provided and guided with opportunities that involved repetitive grouping and/or branching as described. They were able to demonstrate a high degree of proficiency with programming concepts listed in the curriculum statement, such as iteration, incrementing variables (overall and in groups), and the use of an array. Equivalent levels of skill apply to all option topics.

Assessment Component 4: Examination gave students the opportunity to demonstrate how they had assimilated concepts in the core topics and social issues related to an option topic. Students are more successful in the examination when they are able to apply knowledge to an unseen scenario. This is a specific skill requiring development throughout the year, in order for students to be able to write successfully. Teachers should provide students with opportunities to practise extended-response questions. It is evident to markers that a number of students lacked sufficient practice and resorted to rewording the dot points provided in the question repeatedly.

ASSESSMENT COMPONENT 2: SKILLS TASKS

Teachers should be aware that the skills tasks are of a practical nature and they are asked to follow the requirements specified in the curriculum statement. The tasks are not simply mini-projects, so using the same checklists as the projects is inappropriate, as the user interface expected in a short fixed time frame would be different from that of an open-ended project. In setting two skills tasks in the one option topic, one would expect to see different skills being assessed, such as assessing students' ability to read and understand programming code, and, for the other, having a task built around designing with a skeletal provided and assessing students' ability to complete the design/program. This also appropriately applies to all topics, as an assessment requiring students to construct queries, and possibly a report, for the relational database systems topic involves programming skills, even if the method most commonly used does not involve manually writing the structured query language (SQL).

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ASSESSMENT COMPONENT 3: PROJECTS

A project, as indicated by its weighting, is a major component of this subject. Teachers are encouraged to use materials provided by the SACE Board, such as the skills checklists, to discriminate between levels of student performance when marking student work. Teachers should also reflect on the emphasis within the current checklists (and not rely on those of previous years) and refrain from placing more than 10 to 12% emphasis on the appearance and usability of the user interface. Moderators emphasise processing and programming skills.

To assist with the process of moderation, program codes that students have developed should be available and project outcomes should be able to be tested —just as they would be by the student testing and evaluating his/her own system, and by the teacher when marking the project.

Students were more successful when they concentrated on having a system that met three or more specific outcomes, with these outcomes covering the essential skills listed in the left-hand column of the skills checklist.

For example, when producing a relational database system, it is imperative that students undertake outcomes (normally from queries) that are based across the transaction table of the system. One query should have one criterion with sorting, and another with multiple criteria and sorting. Another query should be statistical in nature, involving grouping and counting/averaging/summing, and possibly with a criterion. A similar query is made into a database report. The main data entry form must allow the user to input data required that meets an essential purpose of the system, such as the lending of a book to a borrower.

With a programming topic, one specific outcome could be based on the construct of condition (If Then Else If), one outcome could involve iteration, and one outcome could involve outputting values that have been appropriately stored in an array.

It is essential that students undertake and complete outcomes that successfully produce results, and then, if time permits, look for further marks by undertaking skills on the optional right-hand side of the checklist.

It was a consideration at moderation that the provision of the right-hand column in the checklist seems to distract students from starting with standard skills and ensuring they produce basic and achievable outcomes that really are what the system should be doing and achieving.

Moderators are seeking to confirm that students demonstrate a range of appropriate skills as described in Learning Outcomes 3 and 4. Students are less successful when a project is skewed towards the user interface and presentation, rather than matching the weightings outlined in the marking scheme.

For the programming option topics, producing a series of pages or forms that merely connect to each other does not satisfactorily meet the criteria for judging performance in projects, particularly analysis. In fact, it may meet only one of the clarifying questions — in regard to user-friendliness. Student work is moderated appropriately if such limited work is presented, as it does not meet Learning Outcome 3 at all, and Learning Outcome 4 only marginally.

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ASSESSMENT COMPONENT 4: EXAMINATION

As in the past, success in the examination required students to be able to apply their knowledge of the core concepts of the subject to scenarios presented in the paper. Successful students showed their ability to use correct terminology appropriately and demonstrate their understanding by carefully reading the information presented in the scenario and answering what was asked in each question.

Less successful students seemed to look for cue words in the question and pour forth a prepared answer regardless of its particular relevance. This lack of attention to detail (when a number of students demonstrate some knowledge of the appropriate concept but do not go on and explain in sufficient relevant detail to earn the marks stated) was a concern through a number of questions in the paper.

Part A: Short-answer and Extended-response Questions

Question 1 *(mean mark: 4.29/6 (72%)).*

Question 2 *(mean mark: 4.41/9 (49%)).*

This question tested Internet connection concepts.

(a) This was reasonably well answered by many students.

(b) Successful students demonstrated their understanding of requirements for connection to the Internet, and avoided restating the information included in the question.

(c) Part (c)(i) required the concepts of ports and part (c)(ii) required the concept of identity or recognition, and these concepts needed to be described within the context.

(d) Successful students gave reasons why the retail outlet would include this feature and the impact on the business' database if the feature was not included. Thankfully, few students mentioned the concept of security, which would have led them astray.

Question 3 *(mean mark: 7.00/16 (44%)).*

This question tested terminology and concepts involved in local area networks and other computer-based communication systems. Successful students had been taught these concepts, and were able to demonstrate their understanding.

(a) To answer appropriately, a student needed to include the five devices mentioned in the bullet points, show appropriate connection to the Internet, and show appropriate connection via routers and switches to the database server and devices, not only for the host school but also for the two remote schools. Wireless access points were often left out. Multiple computers for each school should have been indicated.

(b) Successful answers indicated the geographical differential of the two network types.

(c) Successful answers came from students who read the question carefully and gave a standard description of how data is transmitted in each of the three media, rather than just an example of each transmission medium.

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(d) Successful answers came from students who were able to list and explain two advantages and limitations of using wireless connections, of which there were a number for both. Better answers were those that were more descriptive.

Question 4 *(mean mark: 7.55/22 (34%)).*

This question presented an extended business scenario related to computer-based communications and their operation. Students whose teachers had prepared them by discussing similar situations were generally successful.

(a) Many students mentioned the process of logon, username, and password. Very few students then explained what the network operating system (NOS) then does with the username and password, and what happens so that employees can use the network.

(b) This part was about the concepts of web addresses, ip addresses and how the domain name system (DNS) server displays the home page on the screen. Some students mentioned ip addresses, but not necessarily what the DNS server must store to make the web addresses actually work, and few students answered the role the server must play in displaying the home page.

(c) (i) Successful answers showed that the key similarity between the Internet and an intranet involves the displaying of web-based information The key difference refers to the concept of how many people gain access to each network.

(ii) Successful students appropriately mentioned the role of a proxy server in this process, and software that would be used on any computer, such as at home, that blocks access to sites. The concept of a firewall was not helpful.

(iii) (1) Many students appropriately mentioned browser software.

(2) Successful answers gave the example of an ip address, which is considered to be appropriate to show students' knowledge of these.

(3) Successful answers mentioned a local ip address, the concept that packets are interpreted and sent to the correct computer; that is, a media access control (MAC) address.

(4) Many students mentioned the requirement of encrypting the data, but then did not go on and explain what needs to happen at the other end for the data to be intelligible again.

(iv) Successful students demonstrated knowledge of the transporting of HTML documents over a network, and the difference between tcp and ip with regards to networks and devices (that is, computers).

(v) (1) Was often answered correctly.

(2) This question was built on the concept of how data is transmitted around the Internet. Successful students showed knowledge of packets and the components of a packet, such as time to live, which implies that the packets die. They discussed what happens in the process of displaying information on a user's screen during normal data transmission, using concepts of packet switching and whether all packets belonging to the one document all travel the same pathway or not. The notion that one channel is down doesn't actually change what a student needs to write about to answer the question appropriately.

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Question 5 *(mean mark: 6.75/18 (38%)).*

This question was the main Information Systems question.

(a) Successful students correctly identified the elements of data, hardware, software, and the like. Some students answered inappropriately with elements like input, output, and process, which are appropriate for a computer system, but not for an information system.

(b) (i) Successful answers concentrated on the one aim — what is the real purpose of the information system, which is essentially stated in the first line of the scenario.

(ii) This was successfully answered by a number of students, with the common answer focusing on a printout of a dog's result in the event.

(c) This question required the identification of an improvement and an explanation of why this is an improvement. Successful answers referred to concepts generic to information systems, such as the reduction of errors, reduction in loss of data, speed of data collection, and speed in producing reports. The students were able to relate one or more of these concepts to the actual information system in the scenario. Some students included the concept of less cheating, which was an interesting concept outside of what was expected.

(d) To answer this question appropriately, students included the concept of grouping and then some arithmetic process, such as a count for each group.

(e) A number of students' answered appropriately by describing feedback that would appear on the screen of the hand-held device when the judge has entered a placing.

(f) Successful students read that the hand-held device was functioning (and therefore the batteries were not a constraint) and described constraints that could impair the quick processing of the result, such as going out of range, no electricity to run server, or no microchip. A very common wrong answer ignored the information in the question and incorrectly gave battery failure as a constraint.

Question 6 *(mean mark: 6.47/17 (38%)).*

Every year, the examination contains an embedded processor question with very similar format, so it is disappointing that students seemed to be so ill-prepared to apply basic processor concepts, such as registers, control unit, arithmetic and logic unit (ALU), memory, and secondary storage, to a scenario.

(a) Most students identified one input (car speed) correctly, but many of these identified the road's speed limit as the other. Successful students had read the scenario to realise that this was already in the system, and that the other input was the global positioning system (GPS) signal.

(b) Successful answers were rare. These students demonstrated understanding of how the different memories of an embedded processor involve both data and instructions at different points of the processing cycle. However, general confusion about the role of different forms of memory in a processor indicated that more intentional teaching is needed in this area.

(c) Successful students knew that the ALU does not output.

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(d) Students who understood the difference between hardware and software, and who noticed that the question specifically excluded physical size, generally answered this question successfully by discussing a difference in hardware and by contrasting the role software plays in the two. It is worth noting that two marks requires two points.

(e) A number of students answered this appropriately by considering there would need to be something different occurring on (or around) the road that would change conditions to be different from that held in secondary memory of the Intelligent Speed Adaptation (ISA)/GPS system. They were then able to answer part (e)(ii) appropriately, although it was disturbing to note that students tended to ignore that it is the driver who would still be responsible for whether he or she is driving over the speed limit or not.

Question 7 *(mean mark: 2.83/6 (47%)).*

This question provided students with an opportunity to apply their knowledge to a current issue regarding security of computer-based information systems

Successful students cited three different reasons with an appropriate explanation of the reason. Some students tended to repeat the same reason in slightly different language. A number of students tended to concentrate on the data input (for example, scanning of the face), and didn't show appropriate knowledge of what data is taken, how it is compared, and why this system is preferred.

Part B: Extended-response Questions — Social Responsibility

Successful students included an introduction (without just repeating the scenario), used technical Information Technology terms, structured their response in a logical sequence, wrote with reasonable clarity, and included a conclusion for this question. In this way they gained up to five marks against the communication criterion for judging performance in the examination.

The four dot points in each question derive directly from the social responsibility section of each option topic. Students were successful when they used the four dot points to structure answers. Many students seem to write very generic answers, as if they were meeting this type of question for the very first time, or else try to recite the answers published in a revision guide from last year's exam.

The fact that students answered so poorly (and less successfully than in previous years) indicates that teachers need to spend more intentional teaching time on this area which is worth over 20% of examination marks.

Question 8 *(Dynamic Websites, mean mark: 6.89/25 (28%)).*

This question was poorly answered. Perhaps some students who had studied Website Programming in class mistakenly chose this question. Even so, few were able to answer appropriately about some common concepts, such as accessibility and recommended practice. In successful answers, students showed understanding of a server-sided context with a database at the back-end of the system.

Question 9 *(Website Programming, mean mark: 11.25/25 (45%)).*

Students demonstrated some understanding of intellectual property rights, generally limiting the discussion to copyright of symbols, and in cases referred to patent acts that apply to the

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United States rather than Australia. Few students covered more technical concepts related to keeping intellectual property secure.

Only a few successful students demonstrated understanding of recommended practices and conventions beyond internal documentation.

Question 10 *(Relational Databases, mean mark: 11.53/25 (46%)).*

This question was well answered by some students, but, like all the extended-response questions, it was about half answered by a number of students. The phrase 'central database', was ignored or misunderstood by all but the most successful students, who showed understanding of where the database file was located, and discussed the different types of user of the database system and where they would access the database file from. These concepts relate to the typical local area network question, for which there is a question in each paper (Question 3 in this paper).

Only the most successful students showed their understanding of the complexities of the ownership of data — no one person or group owns all of the data. These students were able to separate out the data (perhaps by considering the structure of this relational database) and to discuss which group owns which data.

Question 11 *(Multimedia Programming, mean mark: 9.8/25 (39%)).*

This was less well answered than three other option topics. Students were successful when they used the four dot points to structure answers. They understood they had to do more than more than identify a concept, such as stating that a new form of storage is Blu-ray Discs. They were then able to discuss in some detail the implications and usefulness of Blu-ray Discs as a storage medium.

Question 12 *(Application Programming, mean mark: 11.74/25 (47%)).*

This was the second most successfully answered question, but still under 55%

Reasonably well answered by some students, and reasonable marks awarded when they included discussion related to the scenario in each dot point; for example, discussion of the intention of the organisers and how this will affect how software is made available.. In general, students were more successful when they were able to identify a general concept, such as indenting lines of code, and then spell out in some detail one or preferably two reasons why indenting lines of code is a useful practice. As this is general good practice, such a concept did not need to relate so closely to the scenario.

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