2019 VCE Computing: Software Development examination report

General comments

The 2019 VCE Computing: Software Development examination comprised three sections: Section A, which contained 20 multiple-choice questions (worth a total of 20 marks); Section B, which had five short-answer questions (worth a total of 20 marks); and Section C, which was a case study with 17 questions (worth a total of 60 marks).

Section A was answered quite well by most students. In Section B, some students were not able to provide accurate responses to questions and found it difficult to demonstrate their theoretical knowledge or subject-specific terminology correctly.

In Section C, some students found it difficult to apply their knowledge and reference the case study. Another key problem with student responses was that some students simply repeated key terms from the questions and expressed all of their knowledge around that term, whether it was relevant or not.

Students are encouraged to consider the command word of the question (for example, 'describe', 'explain' or 'justify'), the number of marks and the number of lines provided as a guide to the detail and depth of the required response for each question. Students are encouraged to consider subject-specific terminology and ensure they can respond to questions with an appropriate amount of detail. Students should use past examinations and examination reports to review and practise how to respond to command terms appropriately.

Specific information

Note: Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

Section A – Multiple-choice questions

The following table indicates the percentage of students who chose each option. The correct answer is indicated by shading.

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Question	% A	% B	% C	% D	Comments
1	6	13	77	4	
2	8	84	2	6	
3	7	20	32	40	Many students selected the option that displayed the output at the end of the second loop. However, the algorithm provided only outputs the result of the **total** once all the values in the array have been added.
4	6	67	6	21	
5	2	3	15	80	
6	65	12	5	19	
7	14	11	41	34	Many students selected the use of a standard library of tags as the structural characteristic that distinguishes XML files from others. However, one of the key advantages of XML files is that the tags are highly customisable. The inclusion of a header/prolog/declaration statement helps make XML files distinguishable from others.
8	6	2	9	83	
9	14	2	2	81	
10	5	25	6	64	
11	20	20	16	45	Student responses varied considerably for this question. Evaluation strategies typically would not contain solution designs, testing approaches, use case diagrams or adjustments to project plans. Evaluation strategies typically contain criteria, how the criteria will be measured, when the evaluation will occur and who will be involved.
12	2	95	1	1	
13	4	9	77	10	
14	42	8	45	5	Many students did not trace the variables through the algorithm correctly when answering this question, seemingly missing the second increment of the x-variable.
15	2	25	45	28	Student responses varied considerably between the three main processing features of a programming language. Given that the algorithm's 'if' statement is on line 4 and the corresponding 'end if' is on line 6, Option C. is the only possible answer.
16	52	17	28	3	
17	88	6	1	5	
18	15	8	74	3	
19	66	16	11	7	
20	89	5	4	3	

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Section B – Short-answer questions

Question 1

Marks	0	1	2	3	Average
%	26	8	10	57	**2.0**

Most students were able to correctly identify that:

- an existence check can confirm that a response has been entered into a prompt
- a type check can confirm that a numeric value has been entered into a field
- a range check confirms that a numeric date has a value between 1 and 12 entered.

Question 2

Marks	0	1	2	Average
%	28	43	29	**1.0**

Students had difficulty explaining why both measures were important within the given software solution. Many responses contained generic descriptions of data authentication or data protection, or confused the two. Some students also decided to disagree that both were necessary. High-scoring responses were able to explain the importance of both in relation to the private and sensitive data that would be stored by the solution.

The following is an example of a high-scoring response.

> *Both data protection and user authentication are means of ensuring the security of the data. Requiring users to login aims to prevent unauthorized access by those who are trying to gain access to the data, while encrypting the data ensures that if an unauthorised does gain access despite the user authentication requirements, that the data is unreadable and still protected.*

Question 3a.

Marks	0	1	2	Average
%	37	35	28	**0.9**

Students were required to select the calendar control/date-time picker from Mock-up A, then explain why using a calendar control was efficient and why the text box in Mock-up B was not efficient. Student responses suggested a lack of in-depth understanding around what the term ‘efficiency’ meant in the context of the prompt.

A suggested response could be as follows.

The calendar control in Mock-up A to pick the date for the session will allow for a faster selection of date than by typing it in. The field to enter the date in Mock-up B will not be as efficient.

Question 3b.

Marks	0	1	2	Average
%	28	43	29	**1.0**

Students were required to select one of the two drop-down menus from Mock-up B, then explain why using one is effective and why their corresponding text boxes in Mock-up A were not effective. Student responses suggested a lack of in-depth understanding around what the term ‘effectiveness’ meant in the context of the prompt.

A suggested response could be as follows.

Selection of course is limited to the options available from the drop-down box meaning that data will be complete and reasonable (no validation for spelling errors would be required). Typing the course in could become an issue due to user error if not typed in as expected.

Question 4a.

Marks	0	1	2	Average
%	45	40	15	**0.7**

Many students were able to explain the reasons why boundary testing is a key part of checking that solutions meet design specifications, but few were able to explain the concept of constructing appropriate test data that checks boundary values.

A suggested response could be as follows.

Boundary values/testing checks whether conditions within solutions execute as intended. This is important as if appropriate test data/boundary values are not selected and used in testing then the solution may not function as expected.

Question 4b.

Marks	0	1	Average
%	64	36	**0.4**

Many student responses contained a range of values including -1, 0, 20, 21, 30, 50, 51, 60 and 100. Students were required to select four values that would check if the correct value was displayed to users of the solution.

The following was the only response accepted: 20, 21, 50, 51.

Question 5a.

Marks	0	1	2	3	4	Average
%	28	28	31	11	2	**1.3**

Many students were able to propose an incomplete appropriate backup strategy for the shopping centre's data. When strategies are proposed, they should contain a series of steps that include what data would need to be backed up and how, when and where that data would be backed up. Specific timing (for example, weekly or monthly) and location were the commonly omitted details. The justification of the backup strategy should have outlined why the method, timing and location of the backup were necessary to protect the data.

A suggested response could be as follows.

All of the group's data should be backed up using a full back-up once a week, with a differential backup performed every night. Back-ups could be stored in a secure offsite location, using a cloud solution. Back-ups should also be managed by Natasha or a member of her team. This strategy will ensure that all data is backed up in a regular and consistent manner and that any data loss would be minimised to the last differential backup (the previous night).

Question 5b.

Marks	0	1	2	3	4	Average
%	32	24	30	12	3	**1.3**

Many students discussed both archival and disposal of data as part of their responses to this question; however, few appeared to understand the differences between the two. The justification of the strategy should have outlined why the timing and location of data archival and disposal was necessary as part of a wider data management strategy.

Section C – Case study

Question 1

Marks	0	1	2	Average
%	68	27	6	**0.4**

Many students found it difficult to clearly define an information system goal or objective. Where students were able to define an appropriate system goal, often the objective was not related.

The following is an example of a high-scoring response.

Goal: *To manage client accounts more transparently using digital systems*

Objective: *Increase ease of communication between managers and clients by 30%*

Question 2a.

Marks	0	1	2	3	Average
%	19	4	3	74	**2.3**

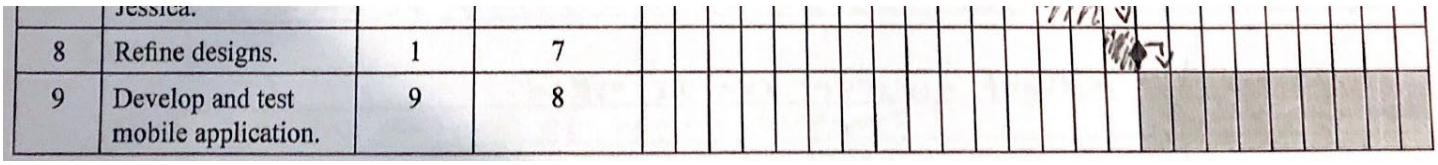
Students answered this question well, mostly shading the correct cells in the Gantt chart.

Question 2bi.

Marks	0	1	Average
%	49	51	**0.5**

Many students were able to correctly place the milestone at the completion of ‘Refine designs’. Most incorrect responses indicated the milestone at the completion of ‘Construct evaluation criteria’.

The following is an example of a correct response.



Question 2bii.

Marks	0	1	Average
%	66	34	**0.4**

Many students were not able to correctly justify the placement of their milestone, indicating that the milestone signified the start of development and testing of the mobile application. Some students also indicated that their milestone signified the end of the project, which is incorrect, as the Gantt chart provided was only a partial chart, not a complete one. Milestones indicate the completion of a key task, which in this case relates to the completion of the design or development stages (dependent on placement of the milestone).

The following is an example of a correct response.

Once task 8 finishes, the design stage is completed which is a major event.

Question 3a.

Marks	0	1	Average
%	61	39	**0.4**

Students found it difficult to succinctly provide an advantage of using observation as a data collection method during analysis. Many responses also did not acknowledge the timing of the proposed observation, suggesting that it could be used to test usability or evaluate the success of the solution.

Question 3b.

Marks	0	1	2	Average
%	26	39	35	**1.1**

Most students were able to suggest that interviews could be used to collect further data, and describe why they would be useful in this context.

The following is an example of a high-scoring response.

Ryan could interview Peter and Jessica in person. This allow Ryan to elaborate on questions about the requirements of the system and enables Peter and Jessica to provide more in-depth responses.

Question 4a.

Marks	0	1	2	3	4	Average
%	13	16	17	24	30	**2.4**

Most student responses were able to correctly identify functional requirements from the case study; however, many found it difficult to identify a relevant non-functional requirement or constraint. Non-functional requirements are attributes the solution should possess, while constraints are limitations that might hinder the development of a solution.

Question 4b.

Marks	0	1	2	Average
%	57	31	12	**0.6**

Students typically found it difficult to discuss how their non-functional requirements and constraints would impact the scope of the project.

The following is an example of a high-scoring response.

For the application being user-friendly, it may impact what features are included and how information might be conveyed. Being able to work with the new Intranet would impact the scope as may increase development time, meaning some features may be left out due to time constraints.

Question 5

Marks	0	1	2	3	Average
%	18	40	35	7	**1.3**

Many students were not able to use the prompts provided in the case study to answer this question. Students are reminded that they are required to use exact wording when specific prompts are provided in the case study.

The following is an example of a high-scoring response.

***A:** Client*

***B:** Educational resources*

***C:** Assign Portfolio Manager*

Question 6a.

Marks	0	1	2	3	Average
%	7	5	59	29	**2.1**

Most students identified the presence of a sign-in button as a security feature in Mock-up B and were able to discuss how it would secure the application and client data. However, many responses did not contain any discussion of Mock-up A as part of the justification.

Question 6b.

Marks	0	1	2	3	Average
%	5	4	54	37	**2.3**

This question was answered quite well, with many students discussing how the text labels enhanced the usability of Mock-up A's interface. Some students also considered how Mock-up B's larger buttons could improve usability for retirees and those with vision or fine-motor skill impairments. Similarly to Question 6a., many responses did not contain any discussion of the opposite mock-up as part of the justification.

Question 7

Marks	0	1	2	Average
%	26	45	29	**1.0**

Students generally answered this question well, describing the naming convention appropriately and explaining how it could assist Ryan during the development of the mobile application.

A suggested response could be as follows.

One convention used within the data dictionary is the use of lowercase letters at the start of the variable name, which indicates which data type is stored by the variable. Including data type in the name of the variable can make development and testing easier for Ryan as the type of data expected to be stored within a variable is clearly indicated.

Question 8

Marks	0	1	2	Average
%	43	40	17	**0.8**

Most students were able to discuss the structural advantage of using records rather than a series of one-dimensional arrays; however, many found it difficult to relate this back to the prompt and the case study.

A suggested response could be as follows.

Records can store a multiple fields related to a single user or client. A series of one-dimensional arrays would be only be able to store one field per array and be difficult to manage within the code, because when one value is updated or deleted within the array, Ryan would have to make sure that the other related arrays are also modified.

Question 9

Marks	0	1	2	3	Average
%	21	41	28	11	**1.3**

Many student responses were unable to identify the data types for each of the variables correctly. This highlighted that a large number of students lacked the ability to appropriately apply their knowledge of data types to a given problem.

The following is an example of a high-scoring response.

AustralianFinancialLicenceNo: ***String***

LinkedAccounts: ***Array***

AccountBalance: ***Floating point***

Question 10

Marks	0	1	2	Average
%	67	20	13	**0.5**

Most student responses lacked the ability to provide a logical and appropriate justification as to why a mobile application was a better option than the rich client option. Mobile applications can process and store data on the server side, while rich client applications would typically process and store all data on the mobile device after downloading it from a server. Few students were also able to provide a relevant link to the case study context as to why a mobile application was better than a rich client.

Question 11a.

Marks	0	1	2	3	Average
%	13	13	12	62	**2.3**

Most students answered this question considerably well, providing answers in the same format as the examples provided in the question. Common errors included repeating tests that had already been performed, testing irrelevant cases or not following the format provided.

Question 11b.

Marks	0	1	Average
%	28	72	**0.7**

Most students answered this question well, describing the error in the STK case regarding the direction of the conditional operator.

Question 11c.

Marks	0	1	Average
%	24	76	**0.8**

Most students were able to rectify the identified error and rewrite the line of pseudocode. The most common error in this question made by students was the omission of the STK case clause.

Question 12a.

Marks	0	1	Average
%	30	70	**0.7**

Most students were able to correctly provide one of the two examples from within the prompt provided. Students were required to include the comment syntax (//).

Question 12b.

Marks	0	1	2	Average
%	23	54	23	**1.0**

Most students were able only to adequately outline one advantage of including internal documentation for the purpose of making future changes to the application, despite being asked for two. Many student responses lacked a second advantage or provided an advantage that was not linked to making future changes.

The following is an example of a high-scoring response.

> *It makes it easier to edit in the future, as the function of all code is clear. Another advantage is that it reduce cost for SmallPort Financial if they need the code maintenance because the programmer can easily identify what the module does which would reduce maintenance cost.*

Question 13

Marks	0	1	2	3	4	Average
%	43	17	21	10	9	**1.3**

Most students were able to describe what diminished data integrity looked like, but few were able to apply their knowledge and discuss the impact on each of the user groups for the intranet and the mobile application.

A suggested response could be as follows.

If the mobile application is not displaying all of a particular client's accounts, then the data is not complete. This will mean that clients may become concerned that SmallPort Financial is not able to manage their accounts in an appropriate way.

The following is an example of a high-scoring response.

> *If the intranet is receiving out-of-date and inaccurate data from the stock exchange data service it could lead to the organisation's employees making bad investment decisions based on old trends. Without having access to the current stock values, the employees could find themselves losing money or unable to effectively and accurately assist their clients.*

Question 14a.

Marks	0	1	2	Average
%	40	35	25	**0.9**

Most student responses were able to propose a series of actions that could test usability; however, many responses were either not explicitly linked to the question prompt/case study or omitted the collection of feedback. Usability testing proposals require both testing to occur and feedback to be provided to those testing solutions.

The following is an example of a high-scoring response.

Ryan and Jessica could get Rosie and Andrew to test the program by attempting to view their investments and then making an enquiry to their Portfolio Manager using the app. They will then complete a survey rating their experience and providing feedback as to what can be improved on.

Question 14b.

Marks	0	1	2	Average
%	37	39	24	**0.9**

Most student responses were able to generically explain how usability testing could improve the mobile application; however, few did so with explicit links to retirees or casual investors.

Question 15a.

Marks	0	1	Average
%	67	33	**0.4**

Few students were able to correctly identify that the *Privacy Act (1988)* was the legislation that had been breached as part of the situation described. The most common errors by students were omitting the correct year from the legislation or stating an irrelevant law.

Question 15b.

Marks	0	1	2	Average
%	43	45	12	**0.7**

Most students were able to describe how Jose had breached the legislation, but very few students were able to explain how SmallPort Financial had failed to adequately protect their data from misuse, seemingly overlooking key information from the question prompt.

A suggested response could be as follows.

José has breached the Privacy Act as he is using client data for purposes not outlined in the company's privacy policy. Whilst SmallPort Financial have a secure area of the network and encrypt data, they do not have sufficient security to protect the data from malicious intent (since everyone can access the secure network and decrypt the data) also violating the Privacy Act.

Question 16a.

Marks	0	1	2	Average
%	38	46	16	**0.8**

Student responses typically identified relevant threats to data used and transmitted by the application; however, very few were able to provide any further details, despite the prompt asking for a description.

An example of a mid-scoring response could be as follows.

One accidental threat to the application is if the device is lost or misplaced, user data may be compromised. A deliberate threat to the data may occur if the application is not secure or protected and information transmitted between clients and SmallPort Financial is intercepted.

Question 16b.

Marks	0	1	2	Average
%	78	7	15	**0.4**

Most students were not able to identify a relevant security protocol, such as TLS, SSL or HTTPS. Students who provided one of these protocols were typically able to justify how the protocol would protect data and information transmitted between the organisation and client mobile devices.

Question 17a.

Marks	0	1	2	Average
%	30	26	44	**1.2**

Most students were able to provide two reasons why employee satisfaction had decreased at the organisation, and high-scoring responses made explicit reference to the data presented in Figure 3 of the case study (for example, decrease in work-life balance, decreased co-worker interactions) and then linked them to the introduction of the new intranet and mobile application.

Question 17b.

Marks	0	1	Average
%	36	64	**0.7**

Most students were able to suggest why client satisfaction had increased since the mobile application had been released and explicitly reference data in Figure 4 of the case study.