November 2015 subject reports

ITGS

Overall grade boundaries

Higher level

Grade:	1	2	3	4	5	6	7
Mark range:	0-11	12-23	24-37	38-47	48-58	59-69	70-100

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0-10	11-22	23-34	35-45	46-57	58-69	70-100

Higher and standard level internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-4	5-8	9-11	12-15	16-18	19-22	23-30

The range and suitability of the work submitted

The Projects were submitted following the requirements in the Handbook of Procedures 2015 Section B3.5. The zipped files were within the 750MB limit.

In too many instances the Teachers Marks Justification forms were not included in the zipped folder as recommended in the Handbook of Procedures 2015. This form provides important

information for the moderator in trying to understand how marks were awarded to be to provide appropriate feedback.

The ITGS Projects focused on the problems of clients who primarily included staff in student's school, owners of local businesses or members of the student's family.

The choice of IT products were generally appropriate for the client's needs and within the expectations for the ITGS Project. The products primarily consisted of websites made with a range of web development tools or online services. A range of videos, desktop publishing and database projects were also submitted.

Overall the quality and use of appropriate techniques was lower than expected for both English and Spanish Projects. In some cases it seemed that the students had not seen the exemplars in the Teacher Support Material nor did they fully understand the requirements of the assessment criteria.

Additional concerns included:

- Most projects used the forms.zip file. However, there were instances where students changed file names and the templates. This is not advisable.
- Some teachers and students did not seem aware of the exemplars in the Teacher Support Material (TSM).
- Some students clearly did not understand the requirements of the assessment criteria.
- Documentation for some criteria was generic and did not refer to the specific client, problem, IT solution, tools, techniques and resources.
- Most projects were submitted in .zip or .rar format. .zip format is preferred because it is cross-platform and can be easily unzipped on both PC and Macintosh computers.
- Some screencasts were not submitted. Others were not submitted in a cross-platform format (i.e. mp4 or mov). File formats such as avi and wmv are not cross-platform.
- Links on cover_page.htm were not thoroughly tested.
- The Product folder must not be empty. The actual Product must be submitted in the original file format and in a cross-platform format wherever possible. Where products are websites and are only fully functional online or cannot be downloaded from online services, sufficient evidence from the making of the product must be provided in the Product folder. In these cases, the URL of the product must be provided on the cover page.

Candidate performance against each criterion

Criterion A: Initial investigation

The clients were mostly appropriate for the Project, This was also true for the problems they identified that required an IT product as a solution. However, in most cases the consultation between the student and the client was not well planned. More attention needs to be focused on the processes and questions used in the consultation so that they can obtain meaningful information. Details (i.e. interviewee, position, date, method of interview) needs to be included in the Consultation and cross referenced in Criterion C.

The explanation of the problem and the inadequacies of the present situation were usually superficial. Instead of explaining these problems and why a solution was necessary, the candidates only tended to write a descriptive elaboration of problem. Candidates need to explain what approaches are currently being used and why they are not successful.

In some cases it was unclear what the proposed IT solution was trying to achieve.

In some cases there was no reference to the Consultation in the text in Criterion A, or there was no explicit link between the record of the Consultation and the text in Criterion A.

Criterion B: Analysis

The information included for the requirement specification section usually lacked detail and was incomplete.

IT terminology used in the subtitles; system interaction, input, output, processing and security does not appear to be understood. The most common problem was that many projects did not present sufficient detail for the hardware and software listed or there were inconsistencies with the resources listed in this criterion and those listed in Criterion D.

The Specific Performance Criteria were often stated as phrases and/or were not measurable. As the Specific Performance Criteria are continually referred to throughout the Project, and particularly in Criterion F, they must be unambiguous, measurable and realistic.

In some cases the justification for the choice of the IT product were limited. Very few students considered how websites, desktop published products and videos would be publicized, distributed or accessed as part of their justification and how the product would address the current problems.

Criterion C: Product schedule

In too many projects, there was little reference product being developed. These schedules tended to be a generic schedule of tasks that could have been used for any product (i.e. website, publication, video or database). The entries were not specific to the problem being addressed or methods being used.

All stages of development must be included for Criterion A through Criterion F. These include: planning, designing, developing, testing and implementing

Criterion D: Product design

Most candidates were not aware of the accepted ways of presenting both the overall and internal structures of the product being developed. This suggests that there was little or no research into this requirement carried out in the time allotted (Topic 3.9, and/or the 30 hours in the Assessment Outline) to support the Project. Research needs to be conducted to find appropriate methods of presenting the overall and internal structure of the chosen product type. This may be done by investigating how problems of a similar nature have been solved.

Diagrams, sketches and appropriate methods for showing the design of the product must be included. They must be legible if they are scanned. Screenshots from the product are not as this suggests that the product may have been reverse engineered.

In many cases the list of resources identified did not include all of the required to create the product. The techniques identified must include all of the appropriate techniques used. Often testing did not include all of the features required to effectively test the functionality of the product. The tests carried out must also directly relate to the Specific Performance Criteria in Criterion B.

The most common problem in this criterion was omitting the signature of the client to indicate agreement with the design of the product.

Criterion E Product Development

Few projects achieved the higher marks in this criterion.

Most projects described the techniques used in the development of the product **(how)**, but did not explain **why** they were appropriate.

The structure of the final product was seldom presented and explained.

In many projects the sources were not cited appropriately.

Websites were the most common product. Often templates from online services were used as a starting point for the development of the website. However, these websites tended to include only basic techniques. Students must give more consideration to how they will include appropriate techniques in their websites. (See *Guidance on the appropriateness of an information technology solution*) rather than opt for a quick and simplistic solution.

One issue that occurred was the inappropriate use of text boxes on screenshots as a way to avoid going over the word limit for the project. Even though these text boxes are not counted by word counting features in software, nor are the moderators instructed to consider this text, if the text within the text boxes is providing descriptions or explanations it will be considered as part of the overall word count. Please see additional guidance in the ITGS Teacher Support Material.

The extended text within this criterion must explain the choice of the appropriate techniques. Where code has been used as a technique, a screenshot of the code should be included along with an explanation of what it does and why it is appropriate. There should also be a second screenshot that shows the outcome of the code.

Criterion F: Product evaluation and future product development

The feedback from the client should focus on both the Specific Performance Criteria as well as the process of developing the product. Feedback that consisted of responses to yes/no questions provides little useful information in Criterion F. A major problem tended to occur in this criterion when there was no link between the Specific Performance Criteria in Criterion B and those evaluated in this criterion. While it known, or expected, that the Specific Performance

Criteria may evolve during the lifetime of the Project, the candidate must document where this has occurred, for example in the Project Schedule as it will probably have involved an additional consultation with the client, so the Moderator does feel that these new criteria have been "parachuted" in.

As with Criterion D, the signature from the client was missing in many cases.

Recommendations for the future development of the product should also be included, they must link to the feedback. In many cases superficial recommendations were made for the future development of the product or recommendations were made that should have been included in the current product.

Criterion G: Requirement elements

Surprisingly some candidates did not submit screencasts in a number of instances. Although an audio commentary is not required, without this audio commentary it can be difficult for the moderator to 'guess' what was actually being demonstrated. The size of the Screencast was a major problem in a few cases and must be limited to 5 minutes for maximum effectiveness.

The most common issue in this criterion was not having any evidence in the product folder, except for the link to the product. An empty product folder should not be submitted as this implies that no techniques (appropriate or not) have been used and this may lead to inconsistencies between this criterion and Criterion E.

Forms.zip must be used for the Project. File names, folder names and the actual templates do not be changed, instead the files need to be saved to doc (or docx) while the Project is being developed and to pdf for submission. If this is done the links on many cover pages will work. Changing fie names, rather than file types is not only counterproductive, but can also lead to a significant increase in the time required to ensure the links from the Cover Page work. These links need to be tested by the student on a number of different devices before they submit their Project. It may be useful to include this in the screencast as the zipping, uploading, downloading and extracting of the Project can cause these links to fail.

Recommendations for the teaching of future candidates

Read the most recent *ITGS Guide* and use the new assessment criteria instead of any other versions. Also *read Guidance on the appropriateness of an information technology solution.*

Review the Project section in previous ITGS subject reports which are available on the Online Curriculum Center (OCC). Please note that there have been minor changes since the introduction of the 'new' Project in May 2012.

Guide students more closely throughout the process of development which would include the following steps for each criterion:
- The teacher explains the particular assessment criterion and command terms used within the level descriptors.
- The teacher demonstrates the application of the level descriptors for the criterion by using exemplars.

- The student develops the criterion based on the needs of the client and conducts research and investigations as needed for the intended IT solution.
- The student submits the criterion for feedback from the ITGS teacher.
- The student makes the necessary edits/adjustments before the next criterion is considered.
- If changes to made to a criterion that may have an impact on others, the student ensures that all of the necessary changes are made before progressing to the next criterion.

Participate in a face-to-face ITGS workshop or an online workshop where additional ITGS Projects are discussed.

Wherever observations or questions arise regarding the ITGS project, post these on the OCC ITGS Discussion Forum.

Higher level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-8	9-16	17-26	27-34	35-43	44-51	52-80

General comments

Higher level Paper 1 and Standard Level Paper 1 are separate components. However, many of the comments that apply to one component apply to the other.

In this session, there were three questions that were common to both papers. They were as follows:

HL Q1 and SL Q1 – Streaming media in education

HL Q2 and SL Q2 – Headcams

HL Q3 and SL Q3 – Next generation cane

The comments for these common questions are included within HL paper one, Section A.

Overall, candidates understood that they needed to structure extended response questions (part (c) and sometimes part (b)) but were unable use structure effectively. Many candidates wrote introductions that essentially repeated the question and/or the information given in the

stem, thus wasting time that could have been spent on developing ideas. Many realized that they needed a conclusion but did not understand that a conclusion requires taking a stance on the issue and justifying that stance, not simply presenting an unsupported opinion.

Far too many candidates are still treating part (b) and (c) questions as an opportunity to present a bullet-point, descriptive list of advantages and disadvantages, regardless of what the actual question asks. Therefore, while most candidates provided positive and negative aspects of the issue raised by the question, they were unable to compare those aspects and draw a conclusion about their relative importance. In addition, most candidates were unable to earn more than 4 marks out of 8 because they merely listed those advantages/disadvantages with little description and no supporting analysis or evaluation.

It is possible that candidates may have seen mark schemes and concluded that what is in the mark scheme is the full answer to the question without realizing that development of the issues is expected, not a list. For that reason mark schemes should not simply be shared with candidates, although the teacher might find them to be a helpful guide in planning activities that encourage candidates to develop their ideas.

Overall, candidates seem to have memorized information without really understanding it, so they struggle when asked to use that information to answer a question that asks for thought rather than memory. Even part (a) questions using command terms such as define, describe, identify, outline and state (AO1) often require candidates to fully understand the underlying concept rather than repeating memorized content.

The areas of the programme and examination which appeared difficult for the candidates

Many candidates seem to have run out of time by the fourth question. This problem should not occur in 2016 as candidates will answer three questions instead of four.

An important issue on this exam was that candidates often did not read the questions carefully. This led them to go off-course in many cases. This may have been time related, see above.

Many candidates had little understanding of how GPS functions, what the cloud is, what project managers, analysts and so on do, as well as the steps in the PDLC/SDLC (sections 3.9 and 3.10 in the syllabus). Robots and AI also caused difficulties although some candidates did very well on Question 7 on computer games. This suggests that candidates perform better when dealing with aspects of information technology that are already very familiar to them, but struggle with issues that are somewhat outside of their direct experience.

The areas of the programme and examination in which candidates appeared well prepared

Candidates had a basic understanding of videos and streaming media, environmental impacts of IT. Candidates understood that they needed to structure their answers; however, the structure did not help them demonstrate higher level thinking skills.

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The strengths and weaknesses of the candidates in the treatment of individual questions

Section A

Common question: HL Question 1 and SL Question 1 – Streaming media in education

(a)   No significant problems.

(b)   Candidates who realized that they needed to consider the impact on the stakeholder. i.e. the teacher or the student, had little difficulty with these questions.

(c)   Candidates could handle this reasonably well. The biggest problem was listing with minimal description. Few achieved more than 4 marks. Although there was no specific stakeholder, a number of candidates identified one or more and this helped them focus their answer.

Common question: HL Question 2 and SL Question 2 – Headcams

(a)(i) Candidates had difficulty defining "cloud." Many used "cloud" as part of the definition without a clear understanding of what that means.

(a)(ii) Surprisingly, few candidates were able to identify the benefits of a relational database although this has been asked quite often in the past. Many provided a definition of relational database rather than answer the question.

(b)   Some candidates did not discuss environmental concerns. Many candidates identified an environmental concern but did not explain how or why it would impact the environment. For example, "Explain" requires that candidates provide reasons why waste harms the environment.

(c)   Candidates were able to list concerns and benefits but were unable to discuss why benefits were more important than concerns or vice versa.

Common question: HL Question 3 and SL Question 3 – Next generation cane

(a)(i) No significant problems.

(a)(ii) Many candidates read the question as if the GPS system were operating in the same manner as the one cars use, as a result most got 2 or fewer marks. Some candidates are still claiming that data is sent to the satellites, which then return the location.

(b)   Candidates do not understand these steps, especially feasibility study, primarily because they do not understand the definition of "feasible". Candidates often confuse this with testing the product after it has been created. Actively teaching the concepts in Topic 3.9 would help candidates on the exam as well as help them understand the reasons for each step in the development of the project.

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(c)   Candidates were able to identify benefits for Carol and her family and some candidates were able to describe and analyze those benefits. Responses were often unbalanced – benefits were outlined but few potential limitations of them or concerns arising were addressed.

Section B

HL Question 4 – Introducing a new IT system

(a)(i)   Most candidates realized that direct changeover is faster and many were able to identify another benefit.

(a)(ii) Most said that workers have time to adjust and most were able to identify a possible risk to the business.

(a)(iii) Few candidates knew what is involved in a feasibility study. This suggests that there is no carryover from the Project.

(b)   Many had an idea of the difference between synchronous and asynchronous but struggled with the question because they didn't quite understand what a discussion forum is.

(c)   Candidates were unable to provide specific answers and often assumed the senior managers were in charge of creating the new system. They also didn't seem to understand the analysis stage of the system development life cycle.

HL Question 5 – New Technology Park in East Africa

(a)(i)   No significant problems

(a)(ii) Candidates didn't seem to understand role of the project manager so were only able to produce very generalized responses, i.e. had difficulty addressing this situation.

(b)(i)   Surprisingly, many candidates were unable to explain one difference between agile and waterfall methodologies. This has not been an issue in previous exams.

(b)(ii) It seems that candidates didn't understand the term "criteria". Fortunately, most candidates listed items from the chart, but some candidates were able to identify a criterion as they tried to explain why those items were important.

(c)   Overall, candidates were able to produce generalized responses that had potential but did not develop the issues with analysis and evaluation.

Section C

HL Question 6 – Robotic cars

(a)(i) No significant problems although candidates should have a basic idea of what different types of sensors do when attached to robots.

(a)(ii) Some candidates provided versions of Asimov's laws as characteristics of robots. A few had a conceptual understanding of the nature of robots.

(b) Most candidates were able to explain one or two problems.

(c) Most candidates were able to identify some benefits and understood that there would be problems as well. However, it was evident that many candidates, particularly the strongest candidates, ran out of time on this question.

HL Question 7 – Computer games

(a)(i) and (a)(ii) This question was answered by few candidates, most of them gamers, so these two questions posed no problems.

(b)(i) Many candidates had a general idea of the nature of fuzzy logic, but few were able to apply that knowledge to creating more realistic NPCs.

(b)(ii) Candidates understood the purpose of a Turing test but were unable to apply that knowledge to this specific situation

(c) This question had the same problem as 6(c). Candidates clearly ran out of time.

Recommendations and guidance for the teaching of future candidates

There are three important areas that need to be addressed.

1. Candidates need to understand concepts rather than memorized definitions, lists of characteristics and so on.

2. Candidates need to be able to apply that understanding to new situations.

3. Candidates need to learn how to demonstrate critical thinking skills in questions b and c.

These three areas are all interconnected. Candidates need opportunities to learn how to analyze new situations and create supported arguments in both oral and written activities. For example, simulations such as committee meetings where stakeholders need to meet to resolve a problem afford candidates a situation in which their positions need to be supported with arguments and evidence based on the point of view of the stakeholder they are representing. A careful debriefing can help them understand what worked well and what didn't i.e. what constituted well supported arguments and where their stances had weaknesses. Likewise,

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candidates can be asked to take on the role of someone who must justify a policy and write a report that does that.

Candidates need to understand the requirements for each of the command terms. This can be done through practice, beginning with Assessment Objective 1 (AO1) terms where details are required, progressing to Assessment Objective 2 (AO2) where analysis is needed, and culminating in Assessment Objective 3 (AO3) where all of these are needed to support a final evaluation. Candidates can exchange and evaluate their work; they can work together to create answers that fulfill the requirements. Precise feedback is critical in helping candidates understand how to improve their responses.

Candidates need to recognize that they need to review/revise the entire course before the exam. It is worth devoting class time to this effort.

Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-6	7-12	13-20	21-26	27-33	34-39	40-60

General comments

See comments for HL Paper 1 including the common questions.

The areas of the programme and examination which appeared difficult for the candidates

GPS systems. This is an area that has become and is likely to remain prominent. Many candidates have little knowledge of how it works. (Question 3)

Stages in the PDLC e.g. Analysis, feasibility study, requirements specification (Question 3) Characteristics of a relational database. (Question 2)

Public/private key encryption (Question 4)

The areas of the programme and examination in which candidates appeared well prepared

The effects of compressing data were reasonably understood (Question 1)

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Most candidates were able to identify causes of environmental concerns (Question 2), although fewer were able to articulate clearly what the possible impacts on the environment might be.

The strengths and weaknesses of the candidates in the treatment of individual questions

For an explanation of common questions on HL Paper 1 and SL Paper 1, see the explanations under HL Paper 1 Section A.

These questions include:
- HL Question 1 and SL Question 1 – Streaming media in education
- HL Question 2 and SL Question 2 – Headcams
- HL Question 3 and SL Question 3 – Next generation cane

SL Question 4 – Bitcoin

(a)(i) Many candidates claimed that open source software was not owned or controlled by anyone, which is not the case.

(a)(ii) and (a)(iii) Many candidates were able to identify a reasonable advantage and disadvantage to the retailer, although these were not always adequately described. Some responses failed to focus on the specified stakeholder (retailer).

(b)(i) Most candidates had some knowledge of the differences between privacy and anonymity but far fewer were able to articulate these differences coherently. Anonymity was less well treated than privacy, many candidates suggested definitions that were more "effective privacy" rather than articulating the clear distinctions between the two.

(b)(ii) Very few candidates had any clear understanding of public/private key encryption. The markscheme did not demand highly detailed or technical responses but few candidates were able to meet even the broad expectations for a mark-worthy answer.

(c)   This attracted a range of fairly random points about P2P networks and centralized servers. Only the better candidates managed to integrate these into a coherent answer to the specific question asked.

SL Question 5 – LOKI bracelet

(a)(i) Many of the characteristics of Bluetooth suggested were so generalized as to be applicable to any network connection and failed to reach the specific requirements of the question.

(a)(ii) This step-by-step elicited a wide range of answers ranging from the perceptive and accurate to responses that were completely copied from the stem, suggesting no additional information and attracting no marks.

(b)   Many candidates could describe characteristics of both password and biometric authentication. Fewer were able to analyze the decision, based on these characteristics.

(c)   This part was reasonably answered by many. Most candidates were able to interpret the phrase "sole control" correctly and at least make an attempt to address this aspect in the answers. Some responses made claims that were not practical, reasonable or supported by the information given in the stem.

Recommendations and guidance for the teaching of future candidates

These recommendations should be read in conjunction with the HL recommendations as many are applicable to both levels.

- Coach candidates on how to respond to part (b) and (c) questions.
- Use role-play to help candidates understand the roles of different stakeholders.
- Encourage candidates to walk-through the use of the relevant IT systems, e.g. what happens first, what results from that action, what responds to that result etc. Again, role-play or other activities that "bring the systems to life" can be very helpful in furthering candidate's understanding of how those systems function and interact with each other and stakeholders.
- Reinforce candidates understanding of the command terms, especially those contained within AO2 and AO3 (e.g. "Analyse", "discuss", "evaluate", "to what extent…")
- In any given scenario, there is an intimate relationship between the stakeholders, the IT systems and the social and ethical issues. Although some candidates are getting better at including those elements in their responses, they are often mentioned as isolated, descriptive statements. Candidates must be encouraged, challenged and supported to draw connections between those elements to formulate a coherent overall response that addresses the question asked and shows clearly how the context of the scenario, the stakeholders, the IT systems involved and the social/ethical issues are inter-dependent and inter-related. The ITGS triangle remains the key focus point and this should be highlighted throughout the ITGS course.

Higher and standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-2	3-5	6-8	9-11	12-15	16-18	19-26

General comments

The article about the introduction and use of an Electronic Medical Record (EMR) system focuses on databases; a commonly addressed topic in the ITGS. This meant that the

candidates should have had significant knowledge and understanding to display. However, the seemingly easier topic did not make a significant difference to the overall pattern of the responses across the grades from those in previous sessions, apart from a small improvement in the middle range which may be attributable to a large number of schools entering candidates for a second session.

However, even though it was clearly apparent that the candidates could easily access the article, the depth of analysis and evaluation was lacking in the same way as in previous examination sessions. In particular the material presented in Criterion C lacked detailed development from issue to impact. Teachers need to emphasize that it is not enough to identify issues and problems but to develop these into detailed impacts and solutions. Without the details analysis and evaluation cannot happen.

The areas of the programme and examination which appeared difficult for the candidates

Again it was a major disappointment to see that many candidates did not attempt to provide conclusions to Criterion C and Criterion D, even after providing a balanced set of impacts. And the conclusions that were provided were often a summary or an additional comment.

In Criterion C the conclusion needs to be a statement coming down on one side or the other, or some of each, about the overall effect of the impact of the use of the information system that is supported by a balanced analysis.

For Criterion D an overall justified evaluation of the effectiveness of the solution being a good solution or not is required, or a bit of both, by comparing the negative and positive analyses within this response.

The areas of the programme and examination in which candidates appeared well prepared

It was pleasing to see many examples of structured responses in Criterion B, Criterion C and Criterion D. However the use of a standard structure does not lead to an increase in the display of higher order thinking skills needed for the higher marks in Criterion C and Criterion D. There appears to be a trade-off between the benefits of templates as ''safety nets' and them restricting access to the highest marks. To get the highest marks, the candidate needs to step away from the 'safety net' and 'back their ability'. In essence, calculated risk taking.

As usual there were still a small number of candidates who included more than one solution in Criterion D. However, this may be less of an issue with the

The strengths and weaknesses of the candidates in the treatment of individual questions

Criterion A

Part A

All except a very small number of candidates were able to identify a concern arising from the use of the EMR system. However, it was relatively rare to find a response that included an explicit description of the impact, result, consequence, effect or outcome of the concern; in other words, why it is a concern. For example*: "The reliability of the IT infrastructure, including the Internet, the database servers and other hardware and software is a concern. If the system is down, health centres will not have access to the EMR data resulting in an impact on the quality of health services for the citizens of Brunei."*

Part B

As usual most candidates answered this question well – specifying who the stakeholder was from the article, the part of the IT system they were using or associated with (this requires the use of specific IT terms such as "*the EMR system*", rather than a generic "*database*" or "*system*"), and what was being done with the IT (not just a general term such as "*storing patient details*" but "*storing the citizen's medical and treatment history*" as stated in the article).

Criterion B

Part A

For this question candidates were required to describe the step-by-step process for using the EMR system. The article included a good general description of the three major steps: the registration process, how to access the data in the EMR and some uses that could be made of the data. But the main concern was that there was a large number of candidates who did not introduce extra IT terms beyond those supplied in the article. For example, candidates should have been able to identify the *BN number* as being the "*primary key*" that is used to "*query*" the EMR database to find the "*matching record*" that contains the medical details of the patient. Most students were structuring their answers in a step by step manner which was pleasing to see.

Part B

Candidates needed to explain the link between two items, how the concern could come about and why it could happen due to a weakness in the IT system and its use. Many candidates basically repeated what was written in Criterion A, part 1(a). The connection between the IT system and the concern is required but few candidates included specific reference to parts of the IT system that enabled the impact of the concern to happen. For example: if the concern was the "*unreliable Internet" access* the candidates were expected to point out "*that this would not happen if the government had provided fast broadband (cable or ADSL) or 3G/4G connectivity infrastructure throughout Brunei*".

Criterion C

It was clear that most candidates knew that a structure was required for the response and provided one based on the various stakeholders or the various issues from the ITGS guide. The most successful were those based on the stakeholders as it enabled them to provide a balanced set of positive and negative impacts on the various stakeholders which is required for the higher marks. A conclusion about the overall impact (positive or negative) of the EMR system cannot be argued unless there is a balanced comparison of impacts that can be used to justify the conclusion.

As well as a justified conclusion candidates are expected to show evidence of critical thinking by making analytical links between impacts, or making evaluative comments about the implications of the impacts in terms of size, the future, possible other effects, impacts on other stakeholder, duration, extent, etc.

A significant concern was the number of candidates who identified impacts but did not provide details describing the impact. This is the same weakness that candidates displayed in Criterion A, part 1(a). For example: "*Since the EMR system is new there may be an issue or concern with the ability of the staff (doctors and others) in the medical centers to effectively use it. If they are not trained properly errors could be made in entering and retrieving data from the system that could cause doctors to make bad treatment decisions such as prescribing drugs for a patient that they are allergic to. This could also lead to legal and other problems for the hospitals and doctors*" (Note the evaluation comment highlighting a possible implication.) "*And as a consequence of the training that is needed the government and hospitals will need to find money, staff and time to develop and implement a training program.*" (Note the explicit analytical link between the two impacts. Too often candidates only provide the impacts and do not connect them.)

Criterion D

The same comment can be made here that has been made in many previous sessions: Most candidates were able to identify a solution to one of the problems found in Criterion C but often the problem was not specified in sufficient detail to be of help when providing a conclusion about the overall effectiveness of the solution. The problem needs to be framed with reference to specific stakeholders and addressed in the conclusion. Also there was not enough detailed description presented about the solution, especially technical details (who, where, when, what, how) or details of policies that need to be implemented. Also the solution needs to be effectively linked to and applied to show how it solves the specific problem. Then candidates need to provide a balanced set of at least two positive and two negative additional evaluations of the effectiveness of the solution in solving the problem, which can be used in a conclusion that argued that the solution overall was effective, or not effective, in solving the problem.

Recommendations and guidance for the teaching of future candidates

In the previous sections there has been advice provided for teachers to use when advising candidates about how to respond to each of the criteria. Examples of the problems and how to

overcome them have been included and more can be found in the published markscheme. As usual there is little evidence of candidates going back to Criterion A and Criterion B and revising their responses. Considering the significant number of inadequate responses for these criteria that could easily be remedied candidates need to review their responses. The exam is also designed to allow for this to occur, candidates are not expected to be writing non-stop for the full 75 minutes.

For Criterion C and Criterion D teachers need to move beyond the structural necessities to emphasizing the critical thinking skills required. The previous examiners reports and the comments and examples above indicate what is required to achieve these marks; and the markscheme clearly shows how the marks are awarded when a candidate demonstrates the appropriate critical thinking skills.

Candidates need to practice responding to various scenarios using the criteria; and also critiquing each other responses based on the comments above and the marking instructions in the markscheme.

Higher level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-4	5-8	9-14	15-17	18-19	20-22	23-30

The areas of the programme and examination which appeared difficult for the candidates

Many teachers appeared to have struggled with the concept of data visualization as there were many candidates who were from the same school who had great difficulty with this question.

The areas of the programme and examination in which candidates appeared well prepared

There has been some progress on the focus of long answers, especially in Spanish students who seemed to answer the question than creating an essay - which was the case in previous years. This may be a result of conversations with teachers on and outside the OCC.

The strengths and weaknesses of the candidates in the treatment of individual questions

Question 1a

Most students knew that Data Mining involved looking for patterns in data and therefore were awarded at least one point. The most common answer to gain a second point was that it involved large quantities of data.

Question 1b

Students generally got 1 or 2 marks for this question. The most common misconception was that controlling access to data (via passwords etc.) or encrypting the data was anonymising it. Otherwise students seemed to understand what an anonymous data set was.

Question 2a

This was possibly the worst answered question on the paper. Even though Data Visualisation was on the list of terms at the end of the case study, many students didn't recognise it when they read the question. The resulting answers were wrong because they focused on the advantages of examining data rather than "Data Visualisation" which is the creation of graphical models and charts which represent different aspects of a data set to make it more understandable to people. In agreement with all teams some benefit of the doubt was given, so students that weakly mentioned the graphical aspect or strongly implied it were given at least one mark.

Question 2b

The question was well written and fair, but exposed a lack of knowledge about command terms, because most student were able to define the terms reasonably well, but failed to compare/contrast them. Students did not react automatically to the command term "Distinguish". As a result weak students got 1 or 2 for their definitions, but some strong students who should have got a 4 missed out on the last mark for not comparing and contrasting the two explicitly.

Question 3

This question was very similar to Q4 and the students mentioned loyalty cards from the start of their answers (as if they had used the same points and plan to answer both questions). We also noticed from the standardisation phase that a lot of students repeated arguments in both Q3 and Q4 as they were on the same Topic. Some students added research to their answer which wasted their time and didn't add to the score, so it should be made clear that this is only rewarded in Q4.

Question 4

This was considered to be a good question by the examiners and was obviously one that the students had prepared for as they all seemed to know several stock arguments, however many

answers lacked depth and balance. There was a big improvement this year in the amount of research that was included in the answers and most of it was relevant, however it wasn't always be used to back up arguments and conclusions. Sometimes research was just mentioned at the start of the answer, to get it out of the way before the arguments were stated. Again, this question was on the same Social and Ethical issue as Q3 so many students seemed to mix / repeat points which wasn't obvious in live marking because of the QIG approach but was obvious in full paper view.

Recommendations and guidance for the teaching of future candidates

ITGS is a very dynamic and fast moving subject which places significant challenges for teachers and students as well as paper authors, examiners and the Subject Manager in keeping abreast with the developments in technology and how they can be incorporated into the subject. That is also part of the attraction of the subject.

Many of the recommendations that were made in the November 2014 Subject Report still apply and have been included below.

- Command Terms – There needs to be a time spent during the course on how to interpret and understand the requirements of the specific command terms. Candidates are missing out on valuable marks as they are not reaching the level for which the command term requires. The OCC has a number of examples and resources on this topic.
- Balance – Very rarely will a candidate be asked to make a decision between 2 alternative approaches when there is an obvious and clear-cut "correct" answer. Therefore candidates are expected to give an opinion only after identifying and judging the merits of each alternative, from the viewpoints of more than one stakeholder. Many candidates gave an "unbalanced" answer that did not show an understanding of the complexity and merits of both possibilities. In cases such as this it is often impossible to decide with the information given, and that IS a valid conclusion.
- Evaluations – For the higher order thinking questions that require evaluation, candidates need to see examples as well as practice developing these extended responses within a classroom environment.
- Extended Responses – Candidates need to practice, under time constraints, an extended response to ensure that they know how to develop a balanced and evaluated response.
- Pre-prepared answers should be avoided as many candidates simply repeated these verbatim in the exam, sometimes missing the point of the question completely because their response had been "triggered" by a keyword in the question.
- Planning Questions – Candidates should take some time, particularly for Question 4, to plan out their points. Candidate will need to be shown this as well as practice it.
- Independent Research - Provide candidates with many opportunities to gather independent research for the higher order questions. Educate candidates on how to gather research and then incorporate it into their responses.
- Markbands - Understand the mark bands for Question 3 and Question 4 to know how marks are allocated. For example, research is necessary at the top bands and candidates should refer more to the question and case study throughout their answer.

- Candidates should understand how to interpret the requirements of the question by breaking down the stem of the question. This will avoid candidates going 'off course'. Also practice re-reading the question to validate if the response corresponds to the question asked.
- A concise and lucid response is appreciated, as is neat handwriting. Due to the limitations of the emarking system, some responses were very difficult to read. Practise by writing an answer under pressure, then scanning it in or photographing it and looking at it on a screen at 50% magnification. If it is easily readable then that is a clear enough response. If not, try to write larger and clearer.
- Likewise, candidates who fill the answer book with long introductions about "How IT is becoming more important every day..." usually receive no marks until they begin to actually answer the question (sometimes on the second page).