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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level and Standard Level

Paper 2

12 pages

Using assessment criteria for external assessment

For external assessment, a number of assessment criteria have been identified. Each assessment criterion has level descriptors describing specific levels of achievement, together with an appropriate range of marks. The level descriptors concentrate on positive achievement, although for the lower levels failure to achieve may be included in the description.

Examiners must judge the externally assessed work at SL and at HL against the four criteria (A–D) using the level descriptors.

- The same assessment criteria are provided for SL and HL.

- The aim is to find, for each criterion, the descriptor that conveys most accurately the level attained by the candidate, using the best-fit model. A best-fit approach means that compensation should be made when a piece of work matches different aspects of a criterion at different levels. The mark awarded should be one that most fairly reflects the balance of achievement against the criterion. It is not necessary for every single aspect of a level descriptor to be met for that mark to be awarded.

- When assessing a candidate's work, examiners should read the level descriptors for each criterion until they reach a descriptor that most appropriately describes the level of the work being assessed. If a piece of work seems to fall between two descriptors, both descriptors should be read again and the one that more appropriately describes the candidate's work should be chosen.

- Where there are two or more marks available within a level, examiners should award the upper marks if the candidate's work demonstrates the qualities described to a great extent. Examiners should award the lower marks if the candidate's work demonstrates the qualities described to a lesser extent.

- Only whole numbers should be recorded; partial marks, that is fractions and decimals, are not acceptable.

- Examiners should not think in terms of a pass or fail boundary, but should concentrate on identifying the appropriate descriptor for each assessment criterion.

- The highest level descriptors do not imply faultless performance but should be achievable by a candidate. Examiners should not hesitate to use the extremes if they are appropriate descriptions of the work being assessed.

- A candidate who attains a high level of achievement in relation to one criterion will not necessarily attain high levels of achievement in relation to the other criteria. Similarly, a candidate who attains a low level of achievement for one criterion will not necessarily attain low achievement levels for the other criteria. Examiners should not assume that the overall assessment of the candidates will produce any particular distribution of marks.

- The assessment criteria must be made available to candidates prior to sitting the examination.

Theme: Education and training

Criterion A — The issue and stakeholder(s) *[4 marks]*

1. **(a)** **Describe** *one* **social/ethical concern related to the IT system in the article.**

   Social/ethical concerns may include the following:

   People and machines:
   Concern – technical problems can emerge when students use BYOD devices during class that cannot be solved such as connecting to the Wi-Fi, websites not functioning of the device; running out of battery. not enough bandwidth, connectivity issues not enough WAP; *etc.*
   Impact – on students is that they cannot work effectively in the lesson; or on the teacher – wastes time in the lesson dealing with tech problems instead of teaching the lesson.

   Digital divide:
   Concern – due to the technical limitations of the their BYOD devices (*ie* "digital divide" in the classroom) due to lower spec of device, not having the right software / some students' families may not be able to afford a suitable BYOD device.
   Impact – not all of the activities in class may be possible by all students.

   Security:
   Concern – increased attacks on the school network due to malware on BYOD devices.
   Impact – spreading of viruses to other devices on the network; network down while malware problems are resolved, corrupted data on the school network *eg* corrupted teaching resources.
   Concern – if students are required to bring their own devices to school physical security of devices is at risk, then who is responsible in case of mugging or theft of the devices.
   Impact – laptops are stolen or damaged or student is mugged for their device.

   Physical security:
   Concern – if students are required to bring their own devices to school physical security of devices is at risk, then who is responsible in case of mugging or theft of the devices.
   Impact – laptops are stolen or damaged or student is mugged for their device.

   Privacy:
   Concern – the accidental sharing of personal information *eg* financial information about a teacher, personal correspondence, personal photos, lack of teacher knowledge about how "syncing" works between mobile devices lead to.
   Impact – embarrassing photos, details of their personal life, being made available by students, copied Works. Digital works are easier to copy for a classmate.

Digital Citizenship:
Concern – the inappropriate use of the devices by students in class;
Impact – students playing games and not doing school work, illegal downloading of movies, software on own device; streaming or storing of inappropriate images, accessing inappropriate websites.

Policies:
Concern – over the lack of policies for the BYOD program and use of devices.
Impact – on network security, increase in inappropriate use *eg* cyberbullying, piracy.

Range of devices:
Concern – students will bring a range of devices with different specifications.
Impact – students may not be able to complete tasks that use applications that are not amongst the specified applications.

(b) **Describe the relationship of *one* primary stakeholder to the IT system in the article.**

Primary stakeholders may include the following:
- teacher(s) who require students to use BYOD devices for classroom activities
- teacher(s) who require students to use BYOD devices for classroom activities
- teacher(s) who sync files between their mobile devices and students' mobile devices
- students used their BYOD devices in class and during their free time in school
- IT manager is responsible for managing the BYOD devices (*ie* registering the BYOD device, maintaining security, restricting access to unapproved websites)
- school administrator who made the decision to implement a BYOD programme in the school
- parents who purchase the BYOD device for their child to use in school.

Mobile technologies is not specific but mentioned in the question so is accepted.

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is identified.
2	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is described **or** both are identified.
3	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is described; the other is identified.
4	Both an appropriate social/ethical concern **and** the relationship of **one** primary stakeholder to the IT system in the article are described.

Criterion B — The IT concepts and processes   *[6 marks]*

2.   (a)   **Describe, step-by-step, how the IT system works.**
            IT system: Using mobile technologies and Wi-Fi in schools.

Answers provided in the article include the following:
- BYOD devices are required to meet certain IT requirements (*ie* Wi-Fi-enabled, contain specific applications)
- student registers their BYOD device with the IT manager
- IT manager registers the student's BYOD device so that it can be used to access the network
- applications to include use of calendar, mapping tool and note taking
- syncing of files by teacher on network and on student devices – how this is done will vary from school to school.

Answers with additional information to that in the article may include the following:

Steps in Registering:
- IT manager needs to check the device to see that required applications have been installed
- IT manager will see if virus checking software has been installed on the student's device
- IT manager may require MAC address of the student's mobile device for additional security
- installation of a security certificate on the BYOD device
- student signs the school agreement for using a BYOD device in school
- student may be required to sign a school agreement in order to use their device in school (is this the same as the point above?) Agree – two aspects – bring the device permission and a use agreement?
- IT manager enters the data for the student's mobile device into the IT system so that the BYOD device is recognized.

AND / OR

Steps in Logging on to School Wi-Fi
- student searches for the available Wi-Fi ID and connects to it
- student can access the school network by entering their login information (*ie* user name, password)
- all requests for Wi-Fi access are checked with the wireless access controller/Wi-Fi device and permission to join the network is established
- school server prevents malware from spreading from students' mobile devices to other devices on the network by checking all internet and device requests against the security policies
- firewall/blocking software prevents the student from accessing unapproved websites

continued …

Steps in Using the BYOD device in school
- files/folders are shared with students through file sharing/email requests
- accepted file sharing requests will allow teachers to update files in these folders and when the student connects to the internet at school, and access these folders on their device, they have access to the updated files. This would happen through a type of GoogleDocs technology that has been outsourced (*eg* to GoogleDocs) or the school sets up its own servers and software
- development on the sharing of calendar
- use of the devices to communicate with teachers.

(b) **Explain the relationship between the IT system and the social/ethical concern described in *Criterion A*.**

Answers may include the following:
People and machines would be a concern if:
- technical problems emerge when using BYOD devices during class that cannot be solved *eg* unable to connect to Wi-Fi, unable to view a website properly (how)
- why – teachers may not be able to address the questions that students may have about how to use their particular mobile device for class activities; lack of updates on the web browser or Operating System.

Digital divide would be a concern if:
- not all of the activities in class may be possible by all students (How) due to the technical limitations of their BYOD device or the specific applications that are installed *eg* student does not have the correct software or version
- why – device is not capable of supporting the software (lower specs) or has not been installed, lack of storage space, or the software may not run on that type of machine.

Security would be a concern if:
- increased attacks on the school network (How) due to malware on BYOD devices
- why – anti malware software not up to date on device or not installed; inadequate gateway anti malware measures
- why – lack of policy: in order to avoid the problem of malware students may should be asked to sign an end-user agreement regarding their BYOD device; including the school regarding updating of security software and sites that can be visited.

Physical security would be a concern if:
- physical security concerns – how – device left unattended when not being used *eg* in bag outside classroom at break, carrying BYOD in device specific bags helps identify to thieves what may be in the bag
- why – lack of storage facilities in school; school uniform helps identify students of BYOD schools so they are easy to target.

Privacy would be a concern if:
- lack of teacher knowledge about how syncing works between mobile devices leads to undesirable files being made available to students. why - personal files were accidentally saved in a shared folder synced with students or the network

Digital Citizenship is a concern:
- if students are using their own device in school for unacceptable behaviour *eg* using social networking sites for cyberbullying, using file sharing software for downloading movies; for having unsuitable software *eg* hacking software on their device, for storing inappropriate images on their own storage areas
- why – students are administrators of their own device and can use these devices in their own home with no restrictions; gateway content filtering and rules may not be set up.

Lack of Policies is a concern:
- how – when students use their devices in school for inappropriate behaviour (see list above) in school
- why – policies have not been written, are not enforced.

Candidates are expected to make reference to relevant stakeholders, information technologies, data and processes. Candidates will be expected to refer to "how the IT system works" using appropriate IT terminology.

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	There is little or no understanding of the step-by-step process of how the IT system works and does not go beyond the information in the article. The major components of the IT system are identified using minimal technical IT terminology.
3–4	There is a description of the step-by-step process of how the IT system works that goes beyond the information in the article. Most of the major components of the IT system are identified using some technical IT terminology. The relationship between the IT system referred to in the article and the concern presented in criterion A is identified, with the some use of ITGS terminology.
5–6	There is a detailed description of the step-by-step process that shows a clear understanding of how the IT system works that goes beyond the information in the article. The major components of the IT system are identified using appropriate technical IT terminology. The relationship between the IT system referred to in the article and the concern presented in criterion A is explained using appropriate ITGS terminology.

Criterion C — The impact of the social/ethical issue(s) on stakeholders *[8 marks]*

3. **Evaluate the impact of the social/ethical issues on the relevant stakeholders.**

Impacts of using BYOD devices for the students:
Positive:
- use the same computing device at home and at school
- students are more motivated to know how to use their own device and applications.

Negative:
- digital divide and not all devices will have equal capabilities (*ie* some students may not able to fully participate in some activities).

Impacts of using BYOD devices for teachers:
Positive:
- be able to include more interactive and collaborative lessons
- access to relevant information is immediately accessible.

Negative:
- not all teachers are equally technically competent to deal with individual problems
- technology is constantly changing and students will be bringing the latest technology to class
- not all teachers are capable of creating technology-enhanced lessons
- differences in capabilities of the students' devices means that the kinds of activities that the teacher can assign may be limited.

Impacts of using BYOD devices for IT managers:
Positive:
- less school systems to maintain.

Negative:
- additional funding must be invested in providing sufficient access to Wi-Fi services
- regular updates to the latest anti-malware software will be necessary
- additional staffing may be needed to support student problems and registering their mobile devices
- additional training may be necessary in order to support students' mobile devices.

Impacts of using BYOD devices for the school (school administration):
Positive:

- save cost of providing school-owned computing equipment
- good for the image of the school to have a BYOD program
- shifts the spending from purchase of hardware and applications to providing infrastructure and service.

Negative:

- some criticism from families who cannot afford BYOD devices
- instances where students have not used their mobile devices for appropriate purposes (*ie* taking undesirable photos, unauthorized recording of teacher's lessons, using proxy servers to by-pass blocked websites)
- complaints from parents where the students were required to bring their mobile devices to school and they are not being used in lessons.

*If the evaluation does not provide any additional information to that in the article, the candidate will be awarded a maximum of **[2 marks]**.*

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	The impact of the social/ethical issues on stakeholders is described but not evaluated. Material is either copied directly from the article or implicit references are made to it.
3–5	The impact of the social/ethical issues on stakeholders is partially analysed, with some evaluative comment. Explicit references to the information in the article are partially developed in the response. There is some use of appropriate ITGS terminology.
6–8	The impact of the social/ethical issues on stakeholders is fully analysed and evaluated. Explicit, well-developed references to information in the article are made appropriately throughout the response. There is use of appropriate ITGS terminology.

Criterion D — A solution to a problem arising from the article   *[8 marks]*

4.   **Evaluate *one* possible solution that addresses at least *one* problem identified in *Criterion C*.**

Solutions to the problem teachers not being able to address technical problems that arise in the classroom:
- provide training for teachers that address common mobile devices and applications that students are likely to be using as part of the BYOD program
- schools must develop policies about which devices and applications are allowed to be used as part of the BYOD program in order for them to be effectively used in the classroom and during free time
- provide technical support that can be on-call to address students' technical problems in the classroom.

Solutions to the problem of IT managers maintaining security and/or limiting website access:
- IT managers must establish policies that include security and restrict access (*ie* require that the BYOD devices adhere to certain technical requirements to maintain security such as must have virus checking software, keep firewall updated to check for malware)
- IT manager must install firewall/blocking software to restrict access to the internet so that students cannot access unapproved websites.

If the evaluation does not provide any additional information to that in the article, the candidate will be awarded a maximum of [2 marks].

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	**One** feasible solution to at least **one** problem is proposed and described. No evaluative comment is offered. Material is either copied directly from the article or implicit references are made to it.
3–5	**One** appropriate solution to at least **one** problem is proposed and partially evaluated. The response contains explicit references to information in the article that are partially developed. There is some use of appropriate ITGS terminology.
6–8	**One** appropriate solution to at least **one** problem is proposed and fully evaluated, addressing both its strengths and potential weaknesses. Areas for future development may also be identified. Explicit, fully developed references to the information in the article are made appropriately throughout the response. There is use of appropriate ITGS terminology.