Information technology in a global society (ITGS): Subject-specific guidance

See also: EE generic guide and EE Teacher support material

Overview

Information technology in a global society (ITGS) focuses on the systematic and critical study of the relationship between information and communication technologies (IT systems) and individuals and society.

ITGS requires:

- sufficient technical knowledge of IT systems in the context in which they are being considered
- an understanding of their impacts on stakeholders.

The issues are often ethical—eg arising from the development, implementation, use or disposal of IT systems—and require informed decision-making.

An ITGS EE offers students an opportunity to:

- undertake research in a ITGS-related topic of personal interest
- develop research skills
- expand their technical understanding of IT
- study an IT system in a real-world scenario
- analyse its impact on individuals, organizations or society in general.

Choice of topic

IT's rapid development, global reach and emerging social and ethical considerations offer ITGS students huge scope in their choice of topic. Students have the opportunity to be innovative in their research in ways that few other subject areas can match.

The choice of topic may emerge from many sources including:

- a news article
- current use of IT system(s)
- issues discussed in class
- personal interest.

The topic must focus on the impact of an IT system or a specific issue that has ITGS at its core. A topic with only an incidental mention of an IT system or that focuses on another technology is not suitable for an ITGS EE.

Students must demonstrate in-depth knowledge of some aspect of IT and its impacts. Their level of expertise must go well beyond general knowledge. They should be able to use IT terminology and concepts competently. Students' explanation of the particular IT system must be supported with appropriate research, including visual evidence.

Sources of information

Students' essays will include evidence obtained from:

- the internet
- books
- newspapers and magazines
- media broadcasts
- publications from expert sources.

The essay will also include primary evidence collected by the student.

Students' sources should be reliable. The essay will, therefore, include some critical analysis of the evidence.

Research question

In choosing their topic, students are strongly advised to concentrate on developing a research question, carrying out relevant primary research, in which the students collect their own data, and secondary research, and applying ITGS theory, tools and techniques.

It is important that the research question is sufficiently focused to allow adequate treatment within the word limit.

Students should avoid topics that depend entirely on summarizing general secondary data, as they are likely to lead to an essay that is essentially narrative or descriptive in nature.

However, students who make effective use of relevant secondary data and primary data in answering the research question will achieve the highest marks.

Students can collect primary data using a wide range of research methods, including:

- investigations
- experiments
- interviews
- other formal research methods.

Students are encouraged to research a current issue. A successful essay will concentrate on one issue, but the issue should be significant enough to require a wide variety of suitable evidence.

Examples of topics

These examples are just for guidance. Students must ensure their choice of topic is focused (left-hand column) rather than broad (right-hand column).

✓ Focused topics	✗ Broad topics
An examination of the extent to which government surveillance cameras in Britain invade privacy and prevent crime	Surveillance cameras and the threat to privacy
Exploring the impact of gamification in the teaching and learning of MYP history at XXX School	Improvements in teaching and learning with gamification
An evaluation of the effectiveness of measures taken to protect online customers of the XXX Bank	Prevention of hacking for online bank accounts
An investigation into the impacts of video gaming on the South Korean culture	The impacts of video games
The extent to which IT monitoring devices have provided a safe environment for mineworkers in Antamina, Peru	IT monitoring devices for mineworkers
An investigation into the use of individual digital footprints by employers in the UK	Digital footprints in the UK

It is essential that the ITGS research topic is based on an issue or impact relating to an IT system or IT systems. This means that the IT system(s) must involve some form of data processing.

EEs that only focus on a technology or on a science topic or are speculative in nature are not suitable for ITGS essays. Similarly, an essay that has a social problem as its focus with only tenuous relevance to an IT system is unlikely to have sufficient depth.

Treatment of the topic
Level of understanding of IT

The ITGS EE is not an exercise in demonstrating IT skills, but students must clearly show in-depth understanding of the IT system in the chosen topic. Students who do not have well-developed IT practical skills or who are not taking ITGS as one of their Diploma Programme subjects are unlikely to show the level of insight that is required for the highest levels of attainment.

However, students should only include program code, mark-up codes (eg HTML) or detailed electronics to support their argument. They should not make such technical expertise the focus of their essay.

Examples of topics, research questions and suggested approaches

Once students have identified their topic and written their research question, they can decide how to research their answer. They may find it helpful to write a statement outlining their broad approach. These examples are for guidance only.

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Topic	**Impacts of specific IT systems in a school environment**
Research question	How have IT systems been used to improve the performance of the XXX School cycling team?
Approach	Secondary research and primary research includes: • Research into the specific IT systems that are used by the XXX School cycling team to improve performance during training and competitions, including diagrams, images, terminology and explanations that go beyond common knowledge. • Evidence collected from manufacturers, professional persons and teams involved in cycling and situations similar to the XXX School cycling team about how these specific IT systems have been used to improve performance in cycling. • Analysis of the extent to which the IT systems have improved performance on the XXX School cycling team based on the data collected from interviews with the cycling team coaches and quantitative data collected from the cycling team. Specific performance tests for the purpose of the EE conducted with cycling team members.

Topic	**Impacts of using the da Vinci Surgical System in a hospital**
Research question	To what extent is the *da Vinci* Surgical System reliable and effective in the XXX Hospital?
Approach	Secondary research and primary research includes: • Presentation of the *da Vinci* Surgical System including annotated images and photographs, terminology and description and explanation of how the system has been implemented and is used during medical operations at XXX Hospital. • Evidence from professional medical journals, manufacturers, online video demonstrations and articles written by doctors who use the *da Vinci* Surgical System. • The researcher has permission to photograph the specific *da Vinci* Surgical System used in XXX Hospital and observe an actual demonstration of how the IT system is used. • Interviews conducted with the XXX Hospital doctors and professional staff who use the system. • Questionnaires are emailed to doctors who use the *da Vinci* Surgical System in the region in order for comparisons to be made with the information collected from doctors in XXX Hospital and the evidence collected from professional sources.

Topic	**Impacts of Google Street View on individuals**

Research question	To what extent does Google Street View invade the privacy and anonymity of individuals?
Approach	Secondary research and primary research: • Explanation of the IT systems that Google Street View uses for capturing street view images in both cities and rural areas worldwide. The edited images are made accessible through Google Maps and Google Earth. The background of the research question is supported by pictures of the Google equipment taking street view images, maps of locations, examples of images taken and details of the specific IT systems used. • Evidence collected from reliable sources to show how Google has to some extent invaded some individual's privacy and anonymity with an explanation of how and where this has occurred and the issues involved. • Google policy statements considered with respect to the methods Google uses, the images that are made publicly available and the legal cases that have emerged. • Evidence of actions taken by Google, governments and individuals to protect privacy and anonymity and their effectiveness are supported by research.

An important note on "double-dipping"

Students must ensure that their EE does not duplicate other work they are submitting for the Diploma Programme. The essay may not in any way be related to assessed material in any of their other IB subjects or TOK or to CAS activities.

The EE and IA

An EE in ITGS is not an extension of the internal assessment (IA) task. Students must ensure that they understand the differences between the two.

- The ITGS project is focused on developing an actual IT product for a client to address the client's specific need or problem. However, the ITGS EE is based upon the research of an impact or issue relating to IT system(s) that has ITGS at its core.
- In an ITGS EE hands-on investigations may be used to explain the IT system(s), how the impacts or issue evolved or possible solutions for the issue. IT tools are not used in the EE to develop a product.
- The ITGS project involves investigating what IT products have been implemented in similar scenarios and how specific IT tools can be used to develop the product. However, research for the ITGS EE involves research and investigation relating to the specific IT system, the related impacts or issues.

Supervisors play an important role here in guiding students on these distinctions. Students risk their diploma if academic misconduct is found.

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Interpreting the EE assessment criteria
Criterion A: Focus and method

(Strands: Topic, Research question, Methodology)

The ITGS topic and research question should focus on how an IT system affects particular stakeholders in a specific situation. The question will contain aspects of the "ITGS triangle":

- particular scenario
- IT system
- specific social and ethical considerations.

A research question that is focused on only an IT system or a new computer-based technology is unlikely to be successful. It also needs to be noted that not all "technologies" are computer-based technologies and may not be relevant to the ITGS EE.

The research question should be concisely stated as a question and must be able to be effectively addressed within the 4,000-word limit. The research question must be placed in an academic context stating the significance of the topic and why it is worthy of investigation.

Research questions that are focused on a particular situation and context (eg school, organization or business) must be thoroughly researched using both secondary and primary resources. For example, school-based topics limit the scope of the investigation to the particular school setting.

Students must first consult sufficient secondary research. This should include a range of relevant sources, including the internet, books, newspapers and magazines.

Students can use primary research methods and investigations to further develop the research question with a view to explaining the related IT systems and for comparisons with findings from secondary research.

Primary research may include:

- first-hand investigations
- interviews
- surveys
- other data collection methods.

Students must clearly explain within the body of the essay the methodologies they use for primary research.

Students must also be aware of the correct processes to use for collecting, analysing, presenting and citing the type of data they have collected. They must make appropriate evidence from their primary research available in the appendices using accepted techniques.

The secondary research and primary research must provide sufficient evidence for students to develop an argument and support their conclusion to the research question.

The success of the ITGS EE is dependent upon:

- a concisely stated research question based on the ITGS triangle
- thorough research using a comprehensive range of sources
- detailed planning leading to a conclusion.

Criterion B: Knowledge and understanding

(Strands: Context, Subject-specific terminology and concepts)

Students must effectively demonstrate their understanding of the concepts related to the research question. This requires a clear explanation of the specific IT system using the appropriate terminology, concepts, diagrams, images and screenshots.

Visual material along with the related text is an effective method for showing how the IT system has contributed to the specific topic in the research question. Wherever they use visual material, students must ensure that they:

- label it clearly
- cite its source
- refer to it in the accompanying text.

Students should show their knowledge and understanding through a logical, well-presented argument based on sound research and investigation leading to an appropriate conclusion(s) for the research question.

The level of knowledge and ITGS terminology should address an IT-aware audience, providing sufficient explanation and examples to support the topic. ITGS terminology refers both to IT terminology and to vocabulary referring to social and ethical considerations.

The level of knowledge and understanding should reflect the specialized knowledge that has been acquired through comprehensive research into the research question.

Criterion C: Critical thinking

(Strands: Research, Analysis and Discussion and evaluation)

The essay should follow a logical development, progressing from the research question through a well-constructed argument to formulating a conclusion that answers the research question.

The argument must be closely related to the research question and to the evidence provided by the secondary and primary research.

Accurate analysis can only be based on quality research. The resources used must be relevant and reliable. Secondary research needs to be conducted before primary research so that the two can be related to one another. The sources used for secondary research must be appropriately cited and documented.

Valid data collection techniques must be used for primary research. These methods must be explained in the body of the essay along with any limitations, assumptions and biases that may be involved.

Students need to use the accepted methodologies for collecting, analysing and presenting data from primary research.

- Where interviews are used to collect data, transcripts from interviews must be accurately documented and made available in the appendix.
- Surveys must be included in the appendix along with a summary of the raw data question by question.
- Well-labelled graphs, charts or tables relevant to the argument should be included within the body of the EE to present data for analysis.

Analysis can occur in several ways, including:

- analysis of findings from secondary sources or experts
- analysis of the results of primary research or investigation (eg outcomes of surveys, results from two different interviews)
- comparison of the results of primary research or investigation with the claims found in secondary research.

Students must use sound deductive reasoning throughout their argument. Specific situations may be presented that demonstrate a particular point. However, it is erroneous reasoning, called "fallacy by induction", to claim that a situation that occurs in one, two or a limited number of instances is true in general.

Students should base their conclusion on the sources and argument that they have presented. The conclusion must not introduce any new evidence. However, it should not merely repeat what has been stated before. It should be a synthesis of the arguments that have been presented and answer the research question. Questions that have emerged as a part of the research and are suitable for further study may be included in the conclusion.

Criterion D: Presentation

(Strands: Structure, Layout)

This criterion assesses the extent to which the presentation follows the standard format expected for academic writing and the extent to which this aids effective communication.

Students may provide a section and subsection structure to their essays, with informative headings, if appropriate. Subheadings should not distract from the overall structure of the essay or argument presented.

Students may include in the body of the essay any charts, images or tables that are relevant to the development of their argument. They should appear as close as possible to their first mention. Students should only use them if they are directly relevant to the research question and are of a good graphic quality.

To ensure legibility of screenshots, images and other visual material, original versions of the essay must be submitted, not photocopies where the colour and quality of visual material has been compromised.

Students must accompany images, charts and tables with analysis and discussion to show how they further the essay's argument.

When graphs and charts are based on the results from a particular question in a survey, the citation should refer to the specific summary of raw data for that question by number.

All charts, images and tables must be properly referenced with respect to their origin or source. Too many graphs, charts and tables detract from the overall quality of the communication.

Tables of processed data should be designed to display clearly the information they contain. They should enhance a written explanation and should not themselves include significant bodies of text. If they do, then these words will be included in the word count.

Students must take care in their use of appendices as examiners are not required to read them. All information with direct relevance to the analysis, discussion and evaluation of the essay must be contained in the main body of the essay.

Any material that is not original must be carefully acknowledged, with specific attention paid to the acknowledgment and referencing of quotes and ideas. This acknowledgment and referencing is applicable to audiovisual material, text, graphs and data published in print and electronic sources. If the referencing does not meet the minimum standard as indicated in the guide (name of author, date of publication, title of source and page numbers as applicable), and is not consistently applied, work will be considered as a case of possible academic misconduct.

A bibliography is essential and has to be presented in a standard format. Title page, table of contents, page numbers, etc must contribute to the quality of presentation.

The essay must not exceed 4,000 words of narrative. Graphs, figures, calculations, diagrams, formulas, equations and information contained in visual material are not included in the word count. Examiners will not read beyond the 4,000-word limit, nor assess any material presented thereafter.

Criterion E: Engagement

(Strands: Process, Research focus)

This criterion assesses the student's engagement with their research focus and the research process. It will be applied by the examiner at the end of the assessment of the essay, and is based solely on the candidate's reflections as detailed on the RPPF, with the supervisory comments and extended essay itself as context.

Students are expected to provide reflections on the decision-making and planning process undertaken in completing the essay. Students must demonstrate how they arrived at a topic as well as the methods and approach used. This criterion assesses the extent to which a student has evidenced the rationale for decisions made throughout the planning process and the skills and understandings developed.

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For example, students may reflect on:

- the approach and strategies they chose, and their relative success
- the *Approaches to learning* skills they have developed and their effect on the student as a learner
- how their conceptual understandings have developed or changed as a result of their research
- challenges they faced in their research and how they overcame these
- questions that emerged as a result of their research
- what they would do differently if they were to undertake the research again.

Effective reflection highlights the journey the student has engaged in through the EE process. Students must show evidence of critical and reflective thinking that goes beyond simply describing the procedures that have been followed.

The reflections must provide the examiner with an insight into **student** thinking, creativity and originality within the research process. The **student** voice must be clearly present and demonstrate the learning that has taken place.