

Computer science extended essay

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Extended essay

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For grade boundary information, please refer to the Grade boundaries for Diploma programme coordinators document available on the PRC.

Extended essay

The range and suitability of the work submitted

A wide range of topics was encountered, the majority of which being within the scope of computer science, with aspects of machine learning featuring prominently. The work presented reflected the full range of performance.

Candidate performance against each criterion

Criterion A: focus and method

The research question is the fundamental element in the development of a successful extended essay. Too often the student goes deep into the process without having established a focused research question. Sometimes the focus will appear during the process, but often the lack of focus remains in place until the end, and this can impact performance against other criteria. In some cases it is clear **from the students' reflections** that the topic itself completely changed during the process with the original ideas appearing **unworkable. Also, at times, a "best-fit" research question** seems to have been determined once the essay has been written. These latter cases will inevitably lead to essays that are not tightly written, that contain material not strictly relevant and to arguments that lack coherence. Extra time taken at the start of the **process to "research the research question" in order to clearly formulate a well-focused research question** with a clearly established path will often be worth the time invested.

The topic itself is not always introduced clearly enough. Explanation as to why it is judged to be a worthy topic for research or why specific algorithms have been chosen are often weak which suggests that the choice is often decided more by availability than for worthiness. Candidates are clearly competent with the research process but are not always as competent at judging the appropriateness of their choice of sources. Clarity in the initial explanation of the methodology that will be followed will also confirm that the main stages of the investigation have been clearly established from the start.

Criterion B: knowledge and understanding

The level reached in this criterion is partly dependent on the depth to which the student goes with respect to the chosen topic and partly on the appropriate choice of sources to support their knowledge and understanding. It is important that one hears the **student's voice when discussing source material so that credit for understanding can be attributed to the student and not just to the sources themselves.**

Criterion C: critical thinking

The criterion is affected by the initial choice of research question. An essay that develops a clear and coherent argument that incorporates all the researched information will only come from one that has established from the start both a focused research question and a well thought out road map. Too often, analysis is limited to a written repetition of what the tables of results and/or graphs superficially show.

Criterion D: presentation

It is quite rare to find an essay that is free from any presentation error, which leads to the impression that this aspect of the extended essay is not one that is given enough consideration by schools. They, perhaps, feel that the average student is already well-versed enough in IT skills not to need any extra preparation.

Although many schools are starting to introduce the use of presentation templates, these do not eradicate errors that would often be picked up by a final proof-reading of the essay. Common issues are the inclusion of unclear images and the failure to label all diagrams, figures and charts.

Criterion E: engagement

This is an opportunity for the student to highlight important moments that occurred during the whole process which significantly affected the development of the essay, and to thus demonstrate their level of engagement through the decisions that were subsequently taken, and the experience gained. Too often, however, the reflections are largely descriptive outlining chronologically the events rather than analysing them.

Recommendations for the supervision of future candidates

As in previous years, the most important recommendation is to research the proposed topic/s at the start of the process in order to arrive at a research question that is sharply focused, of academic worth and one for which enough resources are available. Too many students embark on this process without a clear idea of where they are going.

An EE in computer science offers the opportunity to research a topic that explores recent developments in the IT world. Students should look to take advantage of this opportunity instead of reverting to topics that deal with old technology (e.g. comparison of sorting routines).

Many essays are built around a particular experiment that the student wants to carry out and the resources (programs, data sets etc.) that are readily available. An attempt is then made to match this with a suitable research question and research topic. This approach does not work well and leads to a disjointed essay often with a weak theoretical section. It is important to follow the correct process, beginning with the determination of the problem/issue to be resolved followed by an exploration of the means of achieving this.

Better use should be made of the introductory section. As well as stating the actual research question, this should include some background information on the different elements identified in the research question, make clear the academic worthiness of the proposed research and outline the methodology that will be followed.

All the many elements involved in the research and writing processes involved the development of an EE should have been taught to the students before the actual EE process starts. It is clear from reading the essays that this is not always the case (e.g. referencing, certain aspects of presentation, writing in the correct academic style). Part of the role of the supervisor is to reinforce the understanding and use of these elements but not to teach them for the first time.

The supervisory process is one that is complex to set up in many schools. However, the students' reflections do indicate a lack of consistency with students and supervisors not always being well-matched, leading at times to incorrect advice being given as to the fundamental nature of a computer science EE. This has sometimes led to essays being incorrectly submitted in this subject when they would have been better placed in others.