2910315 Human-computer interaction

Examiner's report: Zone A

Overall performance

The overall standard of answers to this examination paper was quite poor with quite a large number of candidates achieving only very low marks, few gaining very good passes. Despite the range and variability at either end of the scale, about two-thirds of candidates passed and a fair number achieved average marks.

Candidates could choose 3 questions out of a selection of 5 but there was little spread of the questions candidates attempted. The most popular questions were questions 1 and 5. Every candidate chose question 1, almost three-quarters chose question 5 and about half chose question 2. The combination of questions 1, 3 and 5 was the most popular. The percentages of candidates answering each question were:

Question 1	*Psychology*	100%
Question 2	*Design Support*	34%
Question 3	*Design/Models*	52%
Question 4	*Prototyping*	45%
Question 5	*Task Analysis*	69%

The average mark for questions 2 and 5 was higher than the other marks, those for questions 1 and 3 were just below the overall average marks whilst marks for question 4 were much lower. The question combination with the highest average mark was that of questions 1, 2 and 5 and the lowest that of questions 1, 3 and 4. Questions in order of marks are:

Question 2	*Design Support*	*highest*
Question 5	*Task Analysis*	*highest*
Question 1	*Psychology*	*below average*
Question 3	*Design/Models*	*below average*
Question 4	*Prototyping*	*lowest*

General remarks

There were no essay-type questions in this examination paper and no question with only a single part. All questions were on a single independent topic: there was no mixing of different HCI topics within a single question. All questions were broken up into either 2 or 3 sections. In some cases, a section was further broken down into parts. The marks allocated to each section were clearly indicated. The marks for each subsection or part of a section could be calculated by dividing the mark for the section by the number of distinct points that candidates were asked to identify.

Marking was carried out strictly in accordance with this scheme. If a section or subsection was not answered, no marks were given for it. Credit was not given for excessive answers to one section at the expense of others. Answering only half the question would attract only half the available marks. No candidates answered more than the required number of questions.

Implications

It is important to take note of the following points and it is encouraging that, each year, more candidates take note of this since not doing so means that questions are not answered as well as they might be:

- Ensure that you fully understand the topic area of the question.
- Ensure that you can answer every part and section of the question. Only being able to answer some of the question will not help you achieve a good overall mark.
- Ensure that the level and detail of the answer you give corresponds to the marks allocated to that section. Do not spend too much time and effort on a part of the question that, say, is worth only 5 per cent of the overall answer. Similarly, do not merely write cryptic notes or single points for a part of the question that is worth, say, 30 per cent. Try to achieve the balance reflected in the marks indicated.
- Read the question carefully and answer in the way that is requested: wording such as 'describe', 'compare and contrast', 'itemise', 'illustrate', 'explain with diagrams' tells you what sort of answer is expected and what sort of detail you should go into. Make sure you understand what type of answer the Examiner is looking for and do provide diagrams or examples where requested since this is part of the marking scheme for the question.
- Do not spend unnecessary time restating the question, either in your own words or in repeating the question text. This is not required and will use up valuable time.
- Do not spend examination time answering one question at the expense of others: it is generally better to answer three questions fully than one in great detail and two very briefly.
- Do not spend time providing unnecessary diagrams (e.g. of the software life cycle model) where this is not explicitly required. If diagrams are called for, they should be clearly labelled and described. Providing as an answer only an unlabelled diagram from memory will not help attract better marks.
- Do not repeat details from one section in another section: it is unlikely that this is what the Examiner intended and the focus of your answer in each section should be quite distinct.
- Do try to use tables and lists where appropriate – for example, in a question which asks you to contrast two approaches or itemise the differences between two aspects of a topic.

Comments on specific questions

Question 1: Psychology

General:

This question consisted of three parts on the topic of human information processing – specifically, human memory – and is covered in the course

textbook and in the subject guide. Candidates were expected to correctly define each of the terms requested which are all to do with human memory functions and features. Diagrams and examples were requested and would have assisted especially in answering parts a) and b). All candidates attempted the question but results were varied with a low overall average mark and only some parts of the question being answered adequately. Candidates tended to do well in part a), very poorly in part b) – with many candidates not attempting this at all – and reasonably in part c).

Specific:
All parts of this question required that candidates correctly define each of the human memory terms requested. Candidates did well on definitions of short-term and long-term memory in part a) and of 'chunking', 'closure' and 'interference' in part c), although answers were sometimes too short, with that for c,ii) being the one most often missing or incorrect. This asked candidates to consider how such features have been used in the design of screen-based interfaces and required some discussion and a concrete example, from textbooks, or from prior experience. For all parts of a) and c), many responses, although correct in principle, were very brief. At the other end of the scale some candidates gave excessively detailed answers for the small number of marks available to each definition. Diagrams provided were usually adequate and pertinent.

For part b), candidates were expected to identify that knowledge in LTM is assumed to be held in the form of schemas, frames, propositional networks, semantic networks and to show, with diagrams, two different models. Few candidates provided all the appropriate or correct information and quite a few did not even attempt it. Good answers gave correct detail, supported by diagrams that were suitably labelled, with components appropriately identified whilst poor answers were either too short, simply incorrect in their detail, or did not answer some parts. No additional marks were given for more than the required number of models, or for a repetition of the answer given in part a).

Question 2: Design Support

General:
This question consisted of two parts on the topic of design support: part a), a definition of four types of design support techniques and strategies and part b), an example and details of how one of these techniques would be used in the early stages of the design of the interface to a new database. This question was attempted by about one third of candidates but was the best answered of all questions.

Specific:
Good answers to part a) correctly defined each of the terms requested, including the genesis of each technique and a discussion of how it can be applied, emphasising user involvement by specific examples. The focus of the best answers was on usability aspects; on mechanisms of obtaining user requirements; on iterative design and prototyping; and on integration at the appropriate time in the design life cycle. Answers to part a,i) were either very good, or very poor (or missing entirely) but answers for the remainder were generally of a high quality.

Part b) of this question could have been approached in a number of ways but drawings or sketches were expected to be a feature and responses which included those attracted good marks. Good answers covered all the techniques in terms of identifying aspects of the user population before

deciding on the use of one particular design technique. The proposed design method should have included rapid and early prototyping together with usability evaluation at the correct stage. Very good answers would have included a justification of why a particular technique was suitable and a coherent explanation of its advantages and disadvantages, especially the problems and drawbacks of undertaking user-centred design in commercial situations in terms of applicability, resource and implementation requirements, appropriateness and expected outcomes.

Question 3: Design/Models

General:

This question consisted of four parts on the topic of Design and Modelling, part a) being a simple definition of terms; parts b) and c) requesting that the distinction between two standard models in HCI design be made clear and that specific examples be given; and part d) asking for details of how users can become involved in a 'participatory design' process. This was a popular question but did not attract very good marks, being well answered only in part a). The last two parts were very poorly answered whilst almost a quarter of candidates did not even attempt part d).

Specific:

Good answers for part a) gave a coherent definition of HCI and explained how it differs from the process of user interface construction.

Good answers for part b) illustrated the distinction between the two types of modelling, correctly distinguishing between the two mental models of a system and explaining the concept of models as used in HCI Design. A user's model is the user's view of a system and may be inaccurate, incomplete and different for different users; a designer's model is the designer's view of the system, a conceptual model of the structure and functions. A user interacts with the system image. From this and from previous knowledge, he/she develops a mental model. Metaphors are employed by users to make sense of system functions and to relate them to real-world activities, allowing greater learnability and comprehension. Good answers for part c) would have been a concise description of just how a user develops a model of the system via the system image, metaphor and prior learning and in terms of specific examples, as requested. Such examples could have been textbook examples, or from an individual's own prior experience. There were relatively few of these.

Good answers for part d) would have provided a description of the different modes of user involvement in system design and development. This would include a correct definition and description of the term 'user-centred design' and a discussion of techniques such as usability engineering, UCSD, participatory and co-operative design. Emphasis should have been on user involvement, identifying when the techniques may be used, and why, and the appropriate time in the design life cycle when each is appropriate, again with specific examples of systems where UCD techniques have been used. Focus should have been on usability aspects; on mechanisms of obtaining user requirements (ranging from focus groups to formal requirements capture); on iterative design and prototyping; and on systems evaluation (at various design stages). Breadth of description was expected in the answer: simply listing a number of techniques by name made for very poor answers. A description in terms of a case study was not successfully carried out by many candidates so marks for this part were lower than for the rest of the question.

Question 4: Prototyping

General:

This question consisted of four parts on the topics of design support and prototyping that is covered in many chapters of the course textbook and subject guide. Part a) asked why prototyping is so important in HCI design; part b) required candidates to provide a table detailing the role in the design process of three specific design tools and techniques; part c) required a description of the practical problems involved in the use of these three approaches, and part d) asked candidates to explain how a specific type of technique ('paper and pencil' prototyping) could be used in a practical situation, that of the early stages of the design of an interactive computer interface. The question was chosen by less than half of the candidates but was marked lowest with parts b) and d) being answered extremely poorly. Very many candidates only attempted some of the question, notably much of part b), and part c).

Specific:

Good answers to part a) provided an explanation of why prototyping is used in HCI and employed diagrams as illustration. Rapid Prototyping utilises throw-away prototypes through specialised tools. Emphasis is on rapid development of simulations and a path to a target system in an iterative design cycle; horizontal and vertical prototypes differ in their levels of specification and detail and are employed for user testing/evaluation or design mock-ups. Very good answers would have commented on the level of implementation detail, appropriateness at different design life-cycle stages and common usage in design and evaluation.

Part b) was expected to be a correct definition and description of each of the terms requested. Good responses would have done this by emphasising user involvement, identifying when these techniques might be used, and why, and the appropriate time in the design life cycle when each is appropriate. Very good answers would have described specific examples of systems where the techniques have been used. The focus of this question should have been on usability aspects; on mechanisms of obtaining user requirements; on iterative design and prototyping. Diagrams and drawings would have been especially helpful for this part.

Good answers to part c) provided a further expansion of each of the three techniques, identifying especially the problems faced by designers and developers in actual use. Very good answers could have covered issues to do with juts when in the design process such techniques might be used, and questions of availability, task appropriateness, expectations and outcomes, together with some critical assessment of the benefits and drawbacks of each technique in different situations.

There was no one right answer to Part d) and it could have been approached in a number of ways. However, it was expected that answers would use the technique specified. For good answers, important issues to consider were characteristics of the user population, initial requirements setting, and usability evaluation at the correct stage. A very good answer would have included a justification of why this particular technique is useful; a discussion of its advantages and disadvantages, and some of the problems and challenges of undertaking user-centred design in the situation described. It was also expected that drawings or sketches would be a necessary feature of this answer.

Question 5: Task Analysis

General:

This question consisted of three parts on the topic of HCI Task Analysis and asked candidates, in part a) to describe the function of TA; in part b) to explain how HCI TA could be used at different stages in systems development and, in part c) to describe the main features of two different HCI TA techniques, with supporting worked examples and correct notation. The question was a popular one and was answered reasonably well, attracting joint best marks in the whole paper. Candidates tended to do best on parts a) and b) and poorest on part c) with some candidates describing a single technique or a technique which is not HCI-based. It was evident that there was quite a large degree of poor and incorrect notation (especially graphical) for standard techniques, and many candidates provided too much detail for the available marks.

Specific:

Good answers for part a) clearly identified just why TA is used in HCI – as an analytic method of discovering how people carry out their work practices and how existing computer systems are used to support tasks. The information gained can then be used to inform future systems design; applied to the design of training materials and to the redesign of existing interfaces. Very good answers would have identified why TA is undertaken and been able to list specific outcomes. Poor responses had extremely brief or cryptic definitions, concentrated only on task breakdown or listed some generic outcomes from a TA without further explanation.

Good answers for part b) clearly identified the specific stages in the development life-cycle (i.e., initial requirements gathering, prototyping, implementation, validation, post-delivery evaluation) where TA techniques can be employed, differentiating between the different stages and not discussing non-HCI techniques. Very good answers would have provided suitable examples and a good justification for which stages TA is most useful at (initial requirements and evaluation being the most usual).

Good answers for part c) correctly detailed exactly what the question required, using an acknowledged HCI TA technique (e.g., GOMS, KLM, TAKD, HTA) with correct notation, examples and decomposition. Although almost all candidates described HTA and many described GOMS and KLM, very few described Knowledge Based Task Analysis with sufficient understanding or correct notation. Poor answers merely gave the name of a technique, did not give sufficient detail, had incorrect notation, used too simple a task as an example, listed user actions without specifying a technique, did not provide any diagrammatic notation, used the incorrect notation or did not break the task down into suitably detailed levels.