kindly receive the attached group work and strictly adhere to the templated guideline below, each work should have 15-25 pages strictly do a thorough job in your groups in ms word, the work should be submitted two weeks from now through my email pgdresearchh@gmail.com or yusuf.muchelule@jkuat.ac.ke all the work should be sent in ms word before 4:00 p.m strictly. Be blessed

HEIT 2409- ICT & INNOVATION TECHNOLOGY MARKETS DEVELOPMENT

GROUP WORK

Group1: Introduction to electronic commerce, Definition of E- commerce, electronic markets, internet commerce, electronic data Interchange (EDI), Business Strategy in an Electronic Age

Group2: The value chain supply chains Model, inter organizational value chain, Competitive strategy porters model. sustainable competitive advantage using e- commerce.

Group3: Business strategy, Technology strategy Implication of IT, strategy formulation and implementation strategy.

Group4: Business to Business, E-commerce Transaction, E- Market ,Market advantage and disadvantages of E- Markets, E-commerce frameworks, infrastructure and architectures

Group5: EDI and Business EDI Transaction EDI trading pattern , EDI Adoption , Purchasing online Business to consumer E- commerce internet , Elements of E-commerce , e-business.

Group6: ERP Implementation lifecycle: prevaluation screening, package evaluation, project planning phase, gap analysis, reengineering, configuration, training implementation, testing, maintenance

Group7: ERP Manufacturing Perspective: introduction to ERP, Materials requirements planning(MRP), Blll of material (BOM), close loop MRP, Manufacturing resource planning (MRP), Disribution resource planning, just in time (JIT), Kanban, computer aided design (CAD) & Computer aided manufacturing (CAM), Product data management.

Group8: Legal and ethical aspects in e-commerce and e-businesses and their applications, E-Commerce security, issues and prospects,

Group9: Market research and advertisement, digital marketing, internet economy,emergining trends in ICT & innovation technology markets development

7.0 Reference Text Books

Waites, N., Knott, G., (2000). Information and Communication Technology. Business Education Publishers, Limited.

Mackay, F ., (1999). Information and Communication Technology. Hopscotch Educational Publishing Limited.

Jones, C., Cross, T., (2001). Information and Communication Technology: Intermediate GNVQ. Longman.

Van den H., Wijngaert, l., (2005). Information and Communication Technology in Organizations: Adoption, Implementation, Use and Effects. SAGE, 2005

Hajdini (2010). Information Communication Technologies. GRIN Verlag.

Shortis, T(2010). The Language of ICT: Information and Communication Technology. Psychology Press.

Doyle, S (2010). Information and Communication Technology. Nelson Thornes Publisher

Andriessen, K., Koopman, L., (1996).The Introduction of Information and Communication Technology (ICT) in Organizations. Psychology Press.

ASSIGNMENT GUIDE TEMPLATE

UNIVERSITY LOGO, GROUP MEMBERS, AND TOPIC COVERED,TABLE OF CONTENTS, FONT 12 Times new romans, spacing 1.5, alignment justify

TOPIC: UNDERSTANDING USERS

Introduction

In this topic we examine some of the core cognitive aspects of interaction design. Specifically, we consider what humans are good and bad at and show how this knowledge can be used to inform the design of technologies that both extend human capabilities and compensate for their weaknesses. We also look at some of the influential cognitively based conceptual frameworks that have been developed for explaining the way humans interact with computers. Human behaviour that focus on the social and affective aspects of interaction design

The main aims/Objectives of the topic are to:

- Explain what cognition is and why it is important for interaction design.
- Describe the main ways cognition has been applied to interaction design.
- Provide a number of examples in which cognitive research has led to the design of more effective interactive products.
- Explain what mental models are.
- Give examples of conceptual frameworks that are useful for interaction design.
- Enable you to try to elicit a mental model and be able to understand what it Means.

What is cognition?

Cognition is what goes on in our heads when we carry out our everyday activities. It involves cognitive processes, like thinking, remembering, learning, daydreaming, decision making, seeing, reading, writing and talking Norman (1993) distinguishes between two general modes:

- experiential and
- Reflective cognition.

Experiential is a state of mind in which we perceive, act, and react to events around us effectively and effortlessly. It requires reaching a certain level of expertise and engagement. Examples include
Driving a car, reading a book, having a conversation, and playing a video game. In contrast, reflective cognition involves thinking, comparing, and decision-making. This kind of cognition is what leads to new ideas and creativity. Examples include designing, learning, and writing a book. Norman points out that both modes are essential for everyday life but that each requires different kinds of technological support.
Cognition has also been described in terms of specific kinds of processes. These include:

- attention
- perception and recognition
- memory
- learning
- reading, speaking, and listening
- problem solving, planning, reasoning, decision making

It is important to note that many of these cognitive processes are interdependent: several may be involved for a given activity. For example, when you try to learn material for an exam, you need to attend to the material, perceive, and recognize it, read it, think about it, and try to remember it. Thus, cognition typically involves a range of processes. It is rare for one to occur in isolation. Attention is the process of selecting things to concentrate on, at a point in time, from the range of possibilities available. Attention involves our auditory and/or visual senses. An example of auditory attention is waiting in the dentist's waiting room for our name to be called out to know when it is our time to go in. An example of attention involving the visual senses is scanning the football results in a newspaper to attend to information about how our team has done. Attention allows us
To focus on information that is relevant to what we are doing. The extent to which this process is easy or difficult depends on
(i) whether we have clear goals and whether the information we need is salient in the environment:
(i) Our goals if we know exactly what we want to find out, we try to match this with the information that is available. For example, if we have just landed at an airport after a long flight and want to find out who had won the World Cup, we might scan the headlines at the newspaper stand, check the web, call a friend, or ask someone in the street.
When we are not sure exactly what we are looking for we may browse through information, allowing it to guide our attention to interesting or salient items. For example, when we go to a restaurant we may have the general goal of eating a meal but only a vague idea of what we want to eat. We peruse the menu to find things that whet our appetite, letting our attention be drawn to the imaginative descriptions of various dishes. After scanning through the possibilities and imagining what each dish might be like (plus taking into account other factors, such as cost, who we are with, what the specials are, what the waiter recommends, whether we want a two- or three-course meal, and so on), we may then make a decision.
(ii) Information presentation the way information is displayed can also greatly influence how easy or difficult it is to attend to appropriate pieces of information. Here, the information-searching tasks are very precise, requiring specific answers.

Perception refers to how information is acquired from the environment, via the different sense organs (e.g., eyes, ears, and fingers) and transformed into experiences of objects, events, sounds, and tastes. It is a complex process, involving other cognitive processes such as memory, attention, and language. Memory involves recalling various kinds of knowledge that allow us to act appropriately. It is very

versatile, enabling us to do many things. For example, it allows us to recognize someone's face, remember someone's name, recall when we last met them and know what we said to them last. Simply, without memory we would not be able to function. It is not possible for us to remember everything that we see, hear, taste, smell, or touch, nor would we want to, as our brains would get completely overloaded. A filtering process is used to decide what information gets further processed and memorized. This filtering process, however, is not without its problems.

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How does this filtering process work? Initially, encoding takes place, determining which information is attended to in the environment and how it is interpreted. The extent to which it takes place affects our ability to recall that information later. The more attention that is paid to something and the more it is processed in terms of thinking about it and comparing it with other knowledge, the more likely it is to be remembered. For example, when learning about a topic it is much better to reflect upon it, carry out exercises, have discussions with others about it, and write notes than just passively read a book or watch a video about it. Thus, how information is interpreted when it is encountered greatly affects how it is represented in memory and how it is used later.

Another factor that affects the extent to which information can be subsequently retrieved is the context in which it is encoded. One outcome is that sometimes it can be difficult for people to recall information that was encoded in a different context from the one they currently are in. Consider the following scenario:

- You are on a train and someone comes up to you and says hello. You don't recognize him for a few moments but then realize it is one of your neighbours. You are only used to seeing your neighbour in the hallway of your apartment block and seeing he out of context makes him difficult to recognize initially. Another well-known memory phenomenon is that people are much better at recognizing things than recalling things. Furthermore, certain kinds of information are easier to recognize than others. In particular, people are very good at recognizing thousands of pictures, even if they have only seen them briefly before.
- Try to remember the dates of all the members of your family's and your closest friends' birthdays. How many can you remember? Then try to describe what is on the cover of the last DVDICD or record you bought. Which is easiest and why?

Learning can be considered in terms of (i) how to use a computer-based application or (ii) using a computer-based application to understand a given topic. A main observation is that people find it very hard to learn by following sets of instructions in a manual. Instead, they much prefer to "learn through doing." GUIs and direct manipulation interfaces are good environments for supporting this kind of learning by supporting exploratory interaction and importantly allowing users to "undo" their actions, i.e., return to a previous state if they make a mistake by clicking on the wrong option. Carroll has also suggested that another way of helping learners is by using a "training-wheels" approach. This involves restricting the possible functions that can be carried out by a novice to the basics and then extending these

as the novice becomes more experienced. The underlying rationale is to make initial learning more tractable, helping the learner focus on simple operations before moving on to more complex ones.

There have also been numerous attempts to harness the capabilities of different technologies to help learners understand topics. One of the main benefits of interactive technologies, such as web-based, multimedia, and virtual reality, is that they provide alternative ways of representing and interacting with information that are not possible with traditional technologies (e.g., books, video). In so doing, they have the potential of offering learners the ability to explore ideas and concepts in

Different ways. However, the ease with which people can read, listen, or speak differs depending on the person, task, and context. For example, many people find listening much easier than reading. Specific differences between the three models include:

- Written language is permanent while listening is transient. It is possible to reread information if not understood the first time round. This is not possible with spoken information that is being broadcast.
- Reading can be quicker than speaking or listening, as written text can be rapidly scanned in ways not possible when listening to serially presented spoken words.
- Listening requires less cognitive effort than reading or speaking. Children, especially, often prefer to listen to narratives provided in multimedia or web based learning material than to read the equivalent text online.
- Written language tends to be grammatical while spoken language is often ungrammatical. For example, people often start a sentence and stop in midsentence, letting someone else start speaking. There are marked differences between people in their ability to use language. Some people prefer reading to listening, while others prefer listening. Likewise, some people prefer speaking to writing and vice versa.
- Dyslexics have difficulties understanding and recognizing written words, making it hard for them to write grammatical sentences and spell correctly. People who are hard of hearing or hard of seeing are also restricted in the way they can process language.

Many applications have been developed either to capitalize on people's reading, writing and listening skills, or to support or replace them where they lack or have difficulty with them. These include:

Interactive books and web-based material that help people to read or learn foreign languages speech-recognition systems that allow users to provide instructions via spoken commands (e.g., word-processing dictation, home control devices that respond to vocalized requests). Speech-output systems that use artificially generated speech (e.g., written text-to-speech systems for the blind) natural-language systems that enable users to type in questions and give text-based responses (e.g., Ask Jeeves search engine). Cognitive aids that help people who find it difficult to read, write, and speak. A number of special interfaces have been developed for people who have problems with reading, writing, and speaking (e.g., see Edwards, 1992). Various input and output devices that allow people with various disabilities to have access to the web and use word processors and other software packages

Problem-solving, planning, reasoning and decision-making are all cognitive processes involving reflective cognition. They include thinking about what to do, what the options are, and what the consequences might be of carrying out a given action. They often involve conscious processes (being aware of what one is thinking about), discussion with others (or oneself), and the use of various kinds of artefacts, (e.g., maps, books, and pen and paper). For example, when planning the best route

To get somewhere, say a foreign city, we may ask others, use a map, get instructions from the web, or a combination of these. Reasoning also involves working through different scenarios and deciding which is the best option or solution to a given problem. In the route-planning activity we may be aware of alternative routes and reason through the advantages and disadvantages of each route before deciding on the best one. Many a family argument has come about because one member thinks she or she knows the best route while another thinks otherwise.

Comparing different sources of information is also common practice when seeking information on the web. For example, just as people will phone around for a range of quotes, so too, will they use different search engines to find sites that give the best deal or best information. If people have knowledge of the pros and cons of different search engines, they may also select different ones for different kinds of queries. For example, a student may use a more academically oriented one when looking for information for writing an essay, and a more commercially based one when trying to find out what's happening in town. The extent to which people engage in the various forms of reflective cognition depends on their level of experience with a domain, application, or skill. Novices tend to have limited knowledge and will often make assumptions about what to do using other knowledge about similar situations. They tend to act by trial and error, exploring and experimenting with ways of doing things. As a result they may start off being slow, making errors and generally being inefficient. They may also act irrationally, following their superstitions and not thinking ahead to the consequences of their actions. In contrast, experts have much more knowledge and experience
And are able to select optimal strategies for carrying out their tasks. They are likely to be able to think ahead more, considering what the consequences might be of opting for a particular move or solution (as do expert chess players).

Conceptual frameworks for cognition
In the previous section we described the pros and cons of applying knowledge of people's coping strategies in the physical world to the digital world. Another approach is to apply theories and conceptual frameworks to interaction design. In this section we examine three of these approaches, which each have a different perspective on cognition:

- mental models
- information processing
- external cognition

Specifically, this involves providing:
Useful feedback in response to user input easy-to-understand and intuitive ways of interacting with the system In addition, it requires providing the right kind and level of information, in the form of:
Clear and easy-to-follow instructions appropriate online help and tutorials context-sensitive guidance for users, set at their level of experience, explaining how to proceed when they are not sure what to do at a given stage of a task.

Information processing another approach to conceptualizing how the mind works has been to use
Metaphors and analogies a number of comparisons have been made, including conceptualizing the mind as a reservoir, a telephone network, and a digital computer. One prevalent metaphor from cognitive psychology is the idea that the mind is an information processor. Information is thought to

Enter and exit the mind through a series of ordered processing stages. Within these stages, various processes are assumed to act upon mental representations. Processes include comparing and matching. Mental representations are assumed to comprise images, mental models, rules, and other forms of knowledge. The information processing model provides a basis from which to make predictions about human performance. Hypotheses can be made about how long someone will take to perceive and respond to a stimulus (also known as reaction time) and what bottlenecks occur if a person is overloaded with too much information.

The best known approach is the human processor model, which models the cognitive processes of a user interacting with a computer (Card et al., 1983). Based on the information processing model, cognition is conceptualized as a series of processing stages, where perceptual, cognitive, and motor processors are organized in relation to one another. The model predicts which cognitive processes are involved when a user interacts with a computer, enabling calculations to be made of how long a user will take to carry out various tasks. This can be very useful when comparing different interfaces. For example, it has been used to compare how well different word processors support a range of editing tasks.
The information processing approach is based on modelling mental activities that happen exclusively inside the head. However, most cognitive activities involve people interacting with external kinds of representations, like books, documents, and computers-not to mention one another. For example, when we go home from wherever we have been we do not need to remember the details of the route because we rely on cues in the environment (e.g., we know to turn left at the red house, right when the road comes to a T-junction, and so on). Similarly, when we are at home we do not have to remember where everything is because information is "out there." We decide what to eat and drink by scanning the items in the fridge, find out whether any messages have been left by glancing at the answering machine to see if there is a flashing light, and so on. To what extent, therefore, can we say that information processing models are truly representative of everyday cognitive activities? Do they adequately account for cognition as it happens in the real world and, specifically, how people interact with computers and other interactive devices?

External cognition People interact with or create information through using a variety of external representations, e.g., books, multimedia, newspapers, web pages, maps, diagrams, notes, drawings, and so on. Furthermore, an impressive range of tools has been developed throughout history to aid cognition, including pens, calculators, and computer-based technologies. The combination of external representations and physical tools have greatly extended and supported people's ability to carry out cognitive activities (Norman, 1993). Indeed, they are such an integral part that it is difficult to imagine how we would go about much of our everyday life without them. External cognition is concerned with explaining the cognitive processes involved when we interact with different external representations (Safe and Rogers, 1996). A main goal is to explicate the cognitive benefits of using different representations for different cognitive activities and the processes involved. The main ones include:
1. Externalizing to reduce memory load
2. Computational offloading
3. Annotating and cognitive tracing

1. Externalizing to reduce memory load
A number of strategies have been developed for transforming knowledge into external representations to reduce memory load. One such strategy is externalizing things we find difficult to remember, such as

birthdays, appointments, and addresses. Diaries, personal reminders and calendars are examples of cognitive artefacts that are commonly used for this purpose, acting as external reminders of what we need to do at a given time (e.g., buy a card for a relative's birthday).
Other kinds of external representations that people frequently employ are notes, like "stickiest," shopping lists, and to-do lists. Where these are placed in the environment can also be crucial. For example, people often place post-it notes in prominent positions, such as on walls, on the side of computer monitors, by the front door and sometimes even on their hands, in a deliberate attempt to ensure they do remind them of what needs to be done or remembered. People also place things in piles in their offices and by the front door, indicating what needs to be done urgently and what can wait for a while. Externalizing, therefore, can help reduce people's memory burden by:
Reminding them to do something (e.g., to get something for their mother's birthday)
Reminding them of what to do (e.g., to buy a card) reminding them of when to do something (send it by a certain date).

2. Computational offloading: Computational offloading occurs when we use a tool or device in conjunction with an external representation to help us carry out a computation. An example is using pen and paper to solve a math problem.

3. Annotating and cognitive tracing: Another way in which we externalize our cognition is by modifying representations to reflect changes that are taking place that we wish to mark. For example, people often cross things off in a to-do list to show that they have been completed. They
May also reorder objects in the environment; say by creating different piles as the nature of the work to be done changes. These two kinds of modification are called annotating and cognitive tracing:

- Annotating involves modifying external representations, such as crossing off or underlining items.
- Cognitive tracing involves externally manipulating items into different orders or structures.

Annotating is often used when people go shopping. People usually begin their shopping by planning what they are going to buy. This often involves looking in their cupboards and fridge to see what needs stocking up. However, many people are aware that they won't remember all this in their heads and so often externalize it as a written shopping list. The act of writing may also remind them of other items that they need to buy that they may not have noticed when looking through the cupboards. When they actually go shopping at the store, they may cross off items on the shopping list as they are placed in the shopping basket or cart. This provides them with an annotated externalization, allowing them to see at a glance what items are still left on the list that needs to be bought. Cognitive tracing is useful in situations where the current state of play is in a state of flux and the person is trying to optimize their current position. This typically happens when playing games, such as: in a card game, the continued rearrangement of a hand of cards into suits, ascending order, or same numbers to help determine what cards to keep and which to play, as the game progresses and tactics change in Scrabble, where shuffling around letters in the tray helps a person work out the best word given the set of letters (Maglio et al., 1999)

Informing design: from theory to practice Theories, models, and conceptual frameworks provide abstractions for thinking about phenomena. In particular, they enable generalizations to be made about cognition across different situations. For example, the concept of mental models provides a means of explaining why and how people interact with interactive products in the way they do across a range of

situations. The information processing model has been used to predict the usability of a range of different interfaces. Theory in its pure form, however, can be difficult to digest. The arcane terminology and jargon used can be quite off-putting to those not familiar with it. It also requires much time to become familiar with it-something that designers and engineers can't afford when working to meet deadlines. Researchers have tried to help out by making theory more accessible and practical. This has included translating it into:

- design principles and concepts
- design rules
- analytic methods
- design and evaluation methods

A main emphasis has been on transforming theoretical knowledge into tools that can be used by designers. For example, Card et al's (1983) psychological model of the human processor, mentioned earlier, was simplified into another model called GOMS (an acronym standing for goals, operators, methods, and selection rules). The four components of the GOMS model describe how a user performs a computer-based task in terms of goals (e.g., save a file) and the selection of methods and operations from memory that are needed to achieve them. This model has also been transformed into the keystroke level method that essentially provides a formula for determining the amount of time each of the methods and operations takes. One of the main attractions of the GOMS approach is that it allows quantitative predictions to be made

Summary

This class has explained the importance of understanding users, especially their cognitive
Aspects. It has described relevant findings and theories about how people carry out their
Everyday activities and how to learn from these when designing interactive products. It has
Provided illustrations of what happens when you design systems with the user in mind and
What happens when you don't? It has also presented a number of conceptual frameworks
That allows ideas about cognition to be generalized across different situations.

Key points

- Cognition comprises many processes, including thinking, attention, learning, memory,
- Perception, decision-making, planning, reading, speaking, and listening.

- The way an interface is designed can greatly affect how well people can perceive, attend, learn, and remember how to carry out their tasks.
- The main benefits of conceptual frameworks and cognitive theories are that they can explain user interaction and predict user performance.
- The conceptual framework of mental models provides a way of conceptualizing the user's understanding of the system.
- Research findings and theories from cognitive psychology need to be carefully reinterpreted in the context of interaction design to avoid oversimplification and misapplication.

Assignment

The aim of this assignment is for you to elicit mental models from people. In particular, the goal is for you to understand the nature of people's knowledge about an interactive product in terms of how to use it and how it works.

(a) First, elicit your own mental model. Write down how you think a cash machine (ATM) works. Then answer the following questions (abbreviated from Payne, 1991):

- How much money are you allowed to take out?
- If you took this out and then went to another machine and tried to withdraw the
- Same amount, what would happen?
- What is on your card?
- How is the information used?
- What happens if you enter the wrong number?
- Why are there pauses between the steps of a transaction?
- How long are they? What happens if you type ahead during the pauses?
- What happens to the card in the machine?
- Why does it stay inside the machine?
- Do you count the money? Why?

Next, ask two other people the same set of questions.

(b) Now analyse your answers. Do you get the same or different explanations? What Do the findings indicate? How accurate are people's mental models of the way ATMs work? How transparent are the ATM systems they are talking about?

(c) Next, try to interpret your findings with respect to the design of the system. Are any Interface features revealed as being particularly problematic? What design recommendations do these suggest?

(d) Finally, how might you design a better conceptual model that would allow users to? Develop a better mental model of ATMs (assuming this is a desirable goal)?