

OCR Computer Science A Level

1.5.2 Moral and Ethical Issues Intermediate Notes

Specification:

1.5.2

- **Moral, social, ethical and cultural opportunities and risks of digital technology:**
 - Computers in the workforce.
 - Automated decision making.
 - Artificial intelligence.
 - Environmental effects.
 - Censorship and the Internet.
 - Monitor behaviour.
 - Analyse personal information.
 - Piracy and offensive communications.
 - Layout, colour paradigms and character sets.

Morals and Ethics

Ethics and morals are concerned with our values as a community and how the decisions we make will impact different groups of people in society.

With computers becoming an integral part of almost every aspect of our day-to-day lives, it is important that we consider the moral, ethical, environmental, social and cultural implications of these changes. Identifying these issues is the first step to resolving them.

Computers in the Workforce

There are many advantages to involving computers in the workforce, which is why they are key to modern businesses. First, they improve efficiency. Machines have successfully been used to reduce delivery times and speed up manufacturing processes, thus improving customer satisfaction and reducing unit labour costs which feed through as lower prices for consumers. Another advantage is that they reduce strain on workers and remove the need to work in a repetitive and tedious environment.

On the other hand, computerisation has contributed to high levels of structural unemployment. Computerisation has hit middle-income manufacturing jobs the hardest, where entire production lines within factories have been replaced by robots. As such, there has been a shift towards low-income service jobs. With the Internet becoming accessible to almost everyone, there has also been a rise in the services being offered exclusively online. Examples of this include online shopping and online banking services. This has reduced costs of renting out a physical space whilst simultaneously cutting labour costs. One of the major downsides to a significantly computerised workplace is a high dependence on them; if something goes wrong, there will be a major loss of output.

With increased computerisation, demand for people in computing-related occupations has increased. As computers are now an essential part of the workplace, employers now look for workers who are able to confidently and productively use computers.

Automated Decision Making

Automated decision making is used to determine what users should be displayed on their social media feeds. There is a fear that solely reinforcing people's interests creates a dangerous bubble in which people's beliefs are never challenged, leading to a close-minded society.

Algorithms can be used to make decisions that have life-changing consequences. Algorithmic decision-making has been used in [various application processes](#) to determine a person's suitability for mortgages, loans and jobs. Relying entirely on these algorithms could result in people being [treated unfairly](#), as these algorithms are unable to process information with the same [consideration of contextual factors](#) that humans are able to provide.

Algorithms have, however, [improved productivity](#) and made certain processes [more convenient](#). Companies are able to [hire workers faster](#) using algorithms which can screen candidates for certain desired qualities. In driverless cars, the use of algorithmic decision making means decisions are made faster than humans are capable of reacting, so have the potential to save lives. However, algorithmic decision-making in driverless cars raises ethical questions about how to decide [who should be harmed](#) if a scenario arises in which either a pedestrian or the driver must be harmed. This then raises the question about [who is responsible](#) for the consequences of this decision.

Fast decision-making is also useful in [power distribution systems](#) as various inputs can be collected and analysed to [respond instantly to changes](#), such as increasing the power supply when demand is forecast to rise, for example. Ultimately, algorithms must be [thoroughly tested](#) to produce a high-quality piece of software which is [free of bias](#).

Artificial Intelligence

Artificial intelligence is the ability of a computer to [replicate human intelligence](#). AI is playing a key role in furthering research in medicine, where it is used in expert systems to draw [connections between illnesses to form diagnoses](#).

[Expert systems](#), also known as [knowledge-based systems](#), replicate the knowledge and experience an expert in a particular subject would have. They are made up of a [knowledge base](#) which consists of a [set of facts and rules](#). This is interrogated to find diagnoses.

One of the most common uses of AI is [neural networks](#) which 'learn' from a set of data that they are given. This knowledge can be [applied to new data sets](#) and is used in [pattern detection](#) and picking up on [financial fraud](#).

AI is seen within [voice recognition systems](#) which now common within [smart home systems](#). These provide convenience for people but raise concerns about [privacy](#).

Again, artificial intelligence raises questions about **accountability**: who is responsible when things go wrong? If AI ever reaches a stage at which it is considered sentient, what rights should it have?

Environmental Effects

With technological devices being produced cheaply and widely, they have become affordable for lots of people. The downside to this is the effect on the environment. People now throw away more devices than before. Some computer components are **toxic** and can **contaminate water supplies**. Often, this **e-waste** is shipped to **third world countries with lower environmental standards** to be disposed which is considered to be immoral.

More electricity is required to power this greater number of devices. This requires using up our store of **non-renewable fossil fuels** which **emit greenhouse gases** into the atmosphere, contributing to **global warming**. The effects on the planet as a result of our consumption will go on to **impact future generations** as well as **biodiversity**.

Alongside new technologies, there has been a growth in **environmentally-friendly technologies**. Examples of this include **smart home systems** which use temperature sensors to determine when heating should be switched on and motion sensors to switch off lights when a room is empty. Personal computers and laptops offer 'Sleep' and 'Stand-by' features. This suggests technology also has the potential to offset some of the effects on the environment.

Censorship and the Internet

Censorship is the act of **suppressing the content that people are able to view, publish and access**. Some countries use censorship to **block out other political opinions**.

In the UK, ISPs block websites with content associated with **terrorism and extremist political beliefs**. There is fear that censorship may be misused to **push a certain ideology**, which some people consider to be unethical.

Many people believe in the idea of a '**Free Internet**', where **nothing is filtered at all**. However most people agree that some extent of censorship has become necessary for **national security purposes** and to **filter offensive comments and extremist propaganda**.

Censorship can also exist on a smaller level, such as within a school in which pupils may be prevented from accessing material deemed to be unsuitable. Within the workplace, censorship may be used to [maintain high productivity and prevent distractions](#).

Monitor Behaviour

Computers are used to monitor people's behaviour in various environments. In many workplaces, [employers monitor productivity](#) by tracking the websites and applications workers are accessing and the time spent on these.

[Surveillance systems](#) and in particular CCTV cameras, are widely used for [security purposes](#) and to [detect crime](#). This is useful for tracing and punishing criminal activity. Ankle monitors are another kind of surveillance device used on people under house arrest. While some people argue that this is unethical and contravenes basic human rights, others argue that this is a necessary measure that must be taken to put people off committing crime.

Analyse Personal Information

Companies have recently become aware of the value of data, which can [reveal key insights about people and their behaviours](#). [Large amounts of data from a number of sources](#), called [big data](#), can be [analysed to make inferences](#) about people. This process is called [data mining](#) and can be used to identify previously unknown connections between two variables.

There is concern, however, that insights from personal information could reveal things that act against certain individuals. A common example is data mining uncovering that a certain individual is at high risk of developing a particular disease. This raises ethical questions about whether companies uncovering these trends have a responsibility to feed this information back to users.

There is pressure on large firms to be more transparent about the data they collect. The [Data Protection Act developed in 1998](#) is no longer sufficient when it comes to protecting public welfare which is why the [GDPR](#) has been enforced as of May 2018.

Piracy and Offensive Communications

Synoptic Link

You will have come across Computing-related legislation such as the DPA in 1.5.1.

Piracy is the **unauthorised copying of content**, such as software or media. This is a **form of theft and is illegal**, although the Internet has made it easier than ever before to source these types of content online.

While the Internet has opened up countless positive pathways, it also provides a **seemingly anonymous front** for people. Offensive communication refers to any sort of **online harassment, including cyber-bullying or stalking**. The **Malicious Communications Act** introduced in 1998 makes it a **criminal offence to send indecent or offensive messages to anyone online**.

Layout, Colour Paradigms and Character Sets

Layout

When web developers design websites, it is important that they consider **who will be viewing the website** and ensure the website is designed to accommodate for all of these people. The **Equality Act** introduced in 2010 makes it **illegal to discriminate against providing a service to a certain group of people**, which makes this even more important.

Websites must be laid out in a way that makes it **easy for users to navigate between pages**. Menus must be displayed on the appropriate side of the page depending on how the language is read.

Websites must be accessible to people with **visual impairments** who may need to **enlarge text or alter the contrast** in order to view the contents of the website. Websites should provide **alternative text** for images and provide a **screen magnifier option** so people with visual impairments. **Transcripts** of audio files should be provided for those with hearing impairments.

Colour Paradigms

When choosing a colour scheme for a website, web developers must take into account **how different colours are interpreted** around the world. Some colours are regarded as unlucky in certain cultures and have other negative connotations.

Character Sets

In order to make websites accessible to as wide an audience as possible, the contents must be **translated into multiple languages**. **Unicode is the preferred character set** as it is able to represent **over a million characters**.

Synoptic Link

You will have come across character sets such as ASCII and Unicode in 1.4.1.