AIT

Design concepts

Knowledge

- relationship(s) between the elements of design and the principles of design
  - the arrangement of Elements and Principles to create a feeling of completeness
  - formal elements of art are the basic units and the means artists use to create and design works of art. The placement or arrangement of formal elements become "composition" of the art work.
    - Line, Shape, Space, Color and Texture.
  - principles are:
    - Unity (Proximity, Repetition), Balance, Emphasis (Contrast, Proportion), Dominance

- features of a user interface
  - UI includes…
    1. input controls; buttons, text input boxes, radio buttons, check boxes, drop down lists
    2. navigation controls; breadcrumbs, sliders, search fields
    3. information components; tool tips, progress bar, message box

- logical and hierarchical organisation of content
  - UI should be well set out, not cluttered, easy to follow, large sites should have a sitemap for hierarchical organisation
  - UI should have a flow that is easy to understand. Small sites should have a menu system that is named using common names (logical organisation, *e.g. About Us, Contact Us, Home, etc.)*
  - let things go where they are expected to go

- graphical user interface (GUI) suitable for target audience
  - match the interface to the users (target audience)
  - *for example, if a target audience is 5 years old, large pics, not much text, bright colours*
  - *for example, if a target audience is 55 years old, small pics, text, normal colours*

- relevant help features of a graphical user interface
  - usability; people will be able to use the website more effectively with the following;
    - a search function
    - a site map
    - breadcrumbs
  - inclusivity;
    - language choice,
    - cultural sensitivity (images in one culture may not be liked in another culture),
    - gender neutral or specific
  - accessibility;
    - font resizable,
    - alternate text for images,
    - screen readers (software that vision impaired people buy to be able to 'read' the screen)

- choose colour blind friendly colours (not red and green together)

Skills

- annotate designs when working on a digital product and/or digital solution
- use appropriate elements of design and the principles of design for a chosen digital medium
- create logical and hierarchical organisation of content
- develop navigation controls suitable to the chosen digital medium
- critically analyse the relationship(s) between the elements of design and the principles of design

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Hardware

Knowledge

- specifications of digital devices and their impact upon usability
  - DESKTOP COMPUTERS
    - designed to interact via hardware *e.g. mouse and keyboard*
    - interaction impersonal
    - need to sit down and use, or get a desk that is a lot higher to stand up and use
    - have a vertical screen so users can't easily interact with touch screens mode (if avail)
    - can't be moved, so can't be used away from their location
  - MOBILE TABLET AND SMARTPHONE
    - hand held so…
      - can use in many locations
      - must use one hand to hold and one hand to use
    - touch screen…
      - when using user finger blocks part of the screen
      - visual feedback needed for button pushing (audio click or button fade)
      - people with larger fingers expect easier use
      - drag and drop, right click functions are not obvious or sometimes not possible
      - no cursor = no hover feedback
      - direct interaction by touching the icon, more engaging than using a mouse
  - THREE MAIN FORMS OF GENERAL-PURPOSE PERSONAL COMPUTING DEVICES:
    - desktop and laptop computers with a screen, keyboard, and a pointing device *such as a mouse or trackpad, are comfortable for users sitting at a desk for a long period of time.*
    - tablet devices with touchscreens have a form factor that is comfortable for sitting and consuming content (reading webpages, watching movies, etc.), but entering information and creating content via touch-screen control is generally not as comfortable and convenient as with a desktop machine.
    - mobile phones (and similar devices *such as portable music players*) are usually used for short bursts of activity while on the go.

- characteristics of development trends in emerging mobile devices
  - tablets and mobile devices are selling at near desktop levels now
  - improved processing
  - tablets and mobile devices will download more apps than desktops
  - tablets different sizes, *e.g. 9" screen Nexus 9, 6" screen, Nexus 6"*
  - screen resolution is improving for tablets and mobile devices
  - LP-DDR4 memory will make mobile devices faster by 50% and powerful by 40%
  - LP-DDR4 memory can link transfer speeds of 17GBps (gigabytes per second), rising to 34GBps for 64-bit processors

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- suitability of emerging mobile devices to meet client (user) needs
    - client Needs:
        - convenience of wireless is critical for modern users, devices have more functions and capability each year, yet can remain the same size, can fit in a pocket or small bag, wireless available most city places, reliable connectivity
        - interactivity so people can actively engage with apps, email, banking transactions, shopping, taxi and bus services, restaurants and more
        - personalisation - most users have their own device, settings designed to meet exact needs of user, *i.e. visibility and hearing impaired can adjust, passwords can be saved to device for quick access to app resources, your own music library is available as is your internet favourites.*
        - location Services - locate services nearby, or in current location. To find an ATM you can use an app linked to location services.
        - online mobile payments - mobile device able to make payments wirelessly, replacing credit/debit cards
        - remote control of household items - a smartphone can change channels on TV, adjust air conditioning, or record your favourite TV show

- usability of digital devices for specified client requirements
    - clients expect:
        - … devices to offer portable creation of word processing, internet linking via email, or social networking, ecommerce, education, entertainment
        - … tablets which include virtual on-screen keyboards, some have hand writing recognition, attachable keyboards, etc.
        - … better resolution
        - … faster processing speeds to be able to complete higher processing tasks *such as video and image manipulation*
        - … to be able to use these devices with larger fingers

Skills

- evaluate computer system specifications for usability
- compare various mobile devices with other computer systems

A I T

Impacts of technology

Knowledge

- the concept of intellectual property (IP)
  - intellectual property law protects the property rights in creative and inventive endeavours and gives creators and inventors certain exclusive economic rights, generally for a limited time, to deal with their creative works or inventions.
  - intellectual property is the general name given to the laws covering patents, trade marks, designs, circuit layouts, plant breeder's rights and copyright. Each of these forms of intellectual property is protected by a specific Act of the Commonwealth Parliament. The framework for these Acts is largely based on Australia's obligations under international treaties

- intention and purpose of IP in Australia in relation to copyright and/or design of digital products
  - it is designed as a reward to creators to encourage further intellectual creativity and innovation, as well as enabling access by the community to the products of intellectual property.
  - copyright protection is free and automatic in Australia and protects the original expression of ideas, and not the ideas themselves.
  - common works protected by copyright are:
    - books
    - films
    - music
    - sound recordings
    - newspapers
    - magazines
    - artwork
  - copyright also protects originally created:
    - typographical arrangements
    - databases
    - media broadcasts
    - computer programs
    - compositions of other people's work *such as academic journals or CD compilations*
  - the moment an idea or creative concept is documented, on paper or electronically, it is automatically protected by copyright. Because it is automatic in Australia, there is no official registry or application process for copyright protection.
  - copyright protection gives you exclusive rights to license others in regard to copying your work, performing it in public, broadcasting it, publishing it and making an adaptation of the work. Rights vary according to the nature of the work. Those for artistic works, for instance, are different from those for literary and musical works.
  - copyright doesn't protect you against independent creation of a similar work. Legal actions against infringement are at times complicated by the fact that a number of different copyrights may exist in some works - particularly films, broadcasts and multimedia products.

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- the concept of online defamation in Australia
  - defamation: it is defamatory to:
    - state that someone is corrupt, dishonest or disloyal;
    - state someone is suspected of committing, or alleged to have committed an illegal act;
    - ridicule an individual;
    - state someone has a contagious disease, is suffering from insanity, or says something that is likely to cause the person to be shunned or avoided, even if there is no suggestion of bad character.
  - before 2006, Australian states each had different Defamation Acts.
    - The Defamation Act (2006) started in Australia 1st January 2006

- legal action available in Australia to counteract online defamation
  - IF YOU HAVE BEEN DEFAMED:
    - firstly, you can write to the web host and ask for item to be removed
    - you can write to the person who wrote it and ask for them to remove it
    - you can write to the person and ask for them to make amends, remove it, pay damages
    - you can take legal proceedings, but get legal advice first
    - you can sue anyone involved in the publishing. However, read terms and conditions for use of an App. *e.g. Facebook.*
    - you can take someone to court if you believe you have been defamed
    - get legal advice
    - try to get it solved out of court
    - if successful you can be paid damages (money) and also your court costs may also be paid
  - IF YOU DEFAME SOMEONE ELSE:
    - remove the material immediately, and offer to make amends within 28 days. You can make amends in writing and it must include:
      - Offer to publish a reasonable correction
      - Offer to pay expenses reasonably incurred by the complainant to the time of the offer.
    - the victim can accept your offer of atonement. However, if the victim is still bitter about the whole ordeal, and takes you to court, you do have a defense to defamation if the court finds that your offer was indeed reasonable. An apology can also be useful and it's not used as an admission of liability as well.

- the concept of freedom of information (FOI) in Australia
  - refers to the right to privacy in the content of the Internet and information technology
  - the idea is to allow individuals access to sensitive information that the government may hold about them and allow businesses to receive necessary information about current and potential employees, such as criminal records

AIT

- key provisions of FOI in Australia in relation to digital products
  - health professionals and other businesses are required, by law, to keep sensitive information secure

- advantages, disadvantages and implications of virtual and physical collaboration
  - advantages of virtual collaboration:
    - covering all the bases: it is much easier to tackle a large subject because the group is able to divide and conquer
    - sharing Information: When working together virtually, it is much easier for members of the group to share their information and sources because it is already on their computer.
    - working around schedules: Everyone in a group is not going to have the same schedule. For this reason, it is much easier to work around a schedule virtually, because everyone can work through emails and instant messages
    - transportation: do not need to be in one place
  - disadvantages:
    - motivation: Because group members do not have to physically gather to work, they have to encourage themselves to work
    - communication Inconvenience: students have to be self-motivated and reach out more to other group members, rather than just letting the situation take care of it automatically.

- impact of convergence trends in contemporary digital technologies
  - internet protocol is the cementing of the mobile phenomenon 'the web' and 'wireless' now rule
  - mobile phones becoming 'smart' (by better processing, memory, screen resolution) has caused the start of convergence.
  - IMPACTS
    - unemployment
    - convenient
    - increase in digital divide
    - easily distracted
    - fewer devices needed
    - waste disposal – recycle old devices
    - over reliance – disrupts social skills
    - amazing continual progress in processing, memory and resolution
    - new business providing these technologies
    - phone companies need to branch out, change design, keep up with competitors or risk going out of business

AIT

Application skills

Knowledge

- online software tools
  - advantages
    - workers can work from home as work software is available online
    - workers can work at home, on the bus, or while in a cafe on mobile devices
    - no need to download and install any software
    - no need for maintenance of the software on your local machine, upgrades etc.
    - you can use pay as you go software, so no need to pay large amounts up front *e.g. adobe creative suite.*
    - you can use free online software *such as google apps, google docs, Photoshop free online and others*
    - collaboration with fellow workers, clients, friends, now global, using online communication software
  - disadvantages
    - poor internet connectivity will stop online work
    - some online software doesn't have the same features as the locally installed software
    - product quality may be inferior because the online software was developed by a one-man operation
    - product may be insecure and lead to privacy issues.

- video application features
  - multi-layer track editing
    - useful to get different camera angles of the same shot
    - quality of your finished movie is better
    - need high quality movie editing application like Final Cut Pro or Adobe Premiere Pro
  - titles
    - enables you to put titles at the front of the movie
    - enables you to put titles and transitions into your movie
  - transitions
    - these are how you move from one movie clip to another
    - don't get too fancy with transitions
  - effects
    - effects can make a movie so different
    - we don't have $1,000,000 to spend on effects

- sound application features, including sound effects
  - volume
  - delete part of audio

AIT

- publishing features
  - colour scheme
    - when you're making a slideshow, you can choose themes/colour schemes
    - colour schemes are chosen for particular effects.
  - layers
    - layers mean having objects on different depths, this is done by putting one object over another
    - software *such as Photoshop and Illustrator* use layers as a means of moving items around for effect. Layers can help the illusion of 3D form
  - frames
    - frames are containers to hold text and images. These help position images and text to stay in parts of a page, especially webpages.
    - a storyboard could be a type of frame (or a template)
  - typography
    - includes font, font size and alignment
    - serif is better for hard copy
    - sans serif is better to read on the screen
  - templates
    - templates show a pre-planned area for us to work with
  - print/display options
    - to publish, is to make the final product with your work.
    - what the final product looks like – print out, e-mail, website, poster, brochure, etc.

- types of digital publications
  - ePub
    - short for electronic publication
    - a group of files zipped together into a publication
    - has embedded metadata
    - can optimise text for a particular display type and can be opened on Apple and Android
    - can have digital rights management inbuilt into the file, good for copyright
  - pdf
    - stands for portable document format
    - standard that everybody can open
    - it used to be safe as it was difficult to modify, *i.e. your document couldn't be changed*
    - can attach pdfs in an email as most people can open them
  - indd
    - is not commonly used for digital publications
    - called desktop publishing software
    - commonly used to make brochures, school yearbooks, posters
    - it brings together images and text to make digital solutions for web or print
    - it exports easily to normal pdf, interactive pdf, ePub, flash, HTML, shockwave

AIT

- advantages and disadvantages of different types of digital publications
  - ePub (electronic publication)
    - advantages
      - ePub is delivered as one zipped file
      - easy to unpack and easy to layout on the screen
      - user friendly and can be opened easily on many devices
    - disadvantages
      - creating or making an ePub document is not easy to do.
      - creating the zip archive for publishing is also difficult
  - PDF (portable document format)
    - advantages
      - can be opened by most computers.
      - control over the layout and fonts
      - can be made by different software, Microsoft Office, Pages, etc.
      - reader software for PDF is free (Adobe Reader)
      - used to be safe as it was difficult to modify
      - easy to attach to email and upload without trouble
    - disadvantages
      - can sometimes not display correctly on smaller screens
      - not free nor easy to edit
  - INDD (indesign document)
    - advantages
      - easy to export to a variety of formats
      - modify image sizes
    - disadvantages
      - expensive
      - difficult to learn at first

Skills

- use appropriate application software
- create templates suitable for use in appropriate application software
- use video and/or sound application for multi-layer track editing
- use multimedia software to create interactive digital products and/or digital solutions
- use of the specific standards and conventions for a chosen digital medium
  - colour profiles
  - layers
  - frames
  - typography
  - print/display options
- create digital publications

AIT

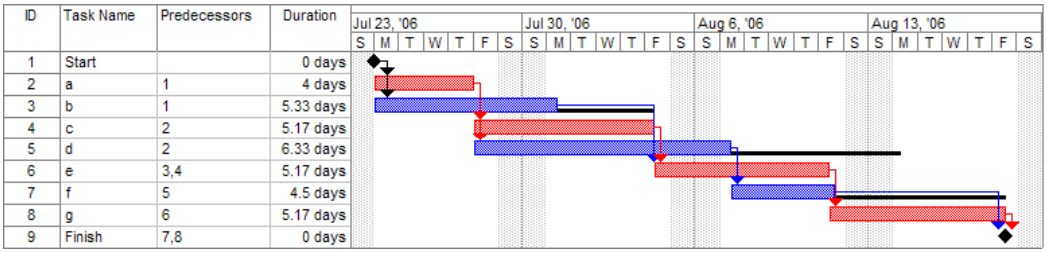
Project management

Knowledge

- project management approaches
  - prototype
    - a model of a product or solution
    - prototyping is an interactive process to develop a system or product. Users and developers interact.
    - it is used for, building a bridge or new skyscraper and completing a website or a graphic design
    - involves 4 steps: Identify basic requirements, develop initial prototype, user review, revise and enhance the prototype
    - advantages
      - user can see the model and be able to talk about it
      - helps resolve discrepancies among users
      - gives users a feel for the final system
      - helps determine technical feasibility
      - helps sell the idea of a proposed system
    - disadvantages
      - leads people to believe the final system will follow
      - gives no indication of performance under operational conditions
      - leads the project team to forgo proper testing and documentation
  - structured
    - traditional style of project management with stages which include; initiation, planning, production, monitoring and closing.
      - initiation stage
        - the needs, cost, who'll use it and who'll develop it
      - planning stage
        - figure out what is involved in the project
        - select the planning team
        - identify tasks and who will do them
        - estimate resources needed for tasks, time and cost
        - develop a schedule and budget
      - production stage
        - commence the tasks from the planning stage
      - monitoring stage
        - if it can continue, how to fix the problems
        - whether a task is taking too long or if unforeseen costs have come up
      - closing stage
        - handing over the finished product, write a review

AIT

- project planning tools
  - storyboards
    - a storyboard is a sequence of pictures showing details for a product
    - these can be hand drawn, or made on a computer, there are even online versions (but they are a bit limited in what you can do)
    - advantages
      - allows the designer to experiment with changes in the sequence before production begins
      - useful way to get client buy-in for linear designs (typically using storyboards for non-linear learning activities becomes too complicated to be useful to a client).
    - disadvantages
      - tend to limit the final product ends up being very linear
      - many affordances of online media cannot be easily captured in the storyboard format. *For example, if the learning experience adjusts depending on the choices of the learner (typically database driven learning applications) it can be very difficult to display in storyboard format*
      - hard to capture online learning that has social interaction between learners and experts
  - site maps
    - a sitemap is a one-page picture showing the whole structure of a website
    - it shows all the webpages on a website
    - used for planning a website and on the finished website which is hyperlinked
    - to draw a sitemap plan use rectangles joined together by lines
    - draw a home page box, under that draw boxes for other webpages.
  - flow charts
    - a flowchart is a series of boxes joined by lines that show flow of information
    - the boxes show the things/nouns and the lines show the flow of data between them. The data flow can go both ways
  - Gantt charts
    - a Gantt chart is a visual graph showing tasks and time for a project



ID	Task Name	Predecessors	Duration
1	Start		0 days
2	a	1	4 days
3	b	1	5.33 days
4	c	2	5.17 days
5	d	2	6.33 days
6	e	3,4	5.17 days
7	f	5	4.5 days
8	g	6	5.17 days
9	Finish	7,8	0 days

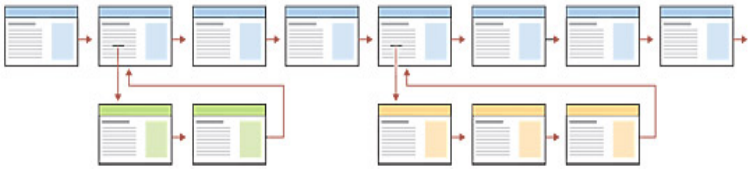
    - a Gant chart shows tasks, time taken for each task, it also shows if a task needs to follow another task. eg ID 4 and 5 above follows 3

- project management software
  - *such as Freedcamp, Rationalplan, Redbooth and Active Collab*

- appearance considerations for a digital product and/or digital solution
  - structure
    - structure needs to be planned and considered
    - *sequence structure*
      - the simplest and most familiar way to organize information
      - this is the structure of books, magazines, and all other print matter
      - may be chronological, a logical series of topics progressing from the general to the specific, or alphabetical, as in indexes, encyclopedias, and glossaries
      - straight sequences are the most appropriate organization for training or education sites
      - more complex web sites may still be organized as a logical sequence, but each page in the sequence may have links to one or more pages of digressions, parenthetical information, or information on other web sites (fig. 3.4, bottom).

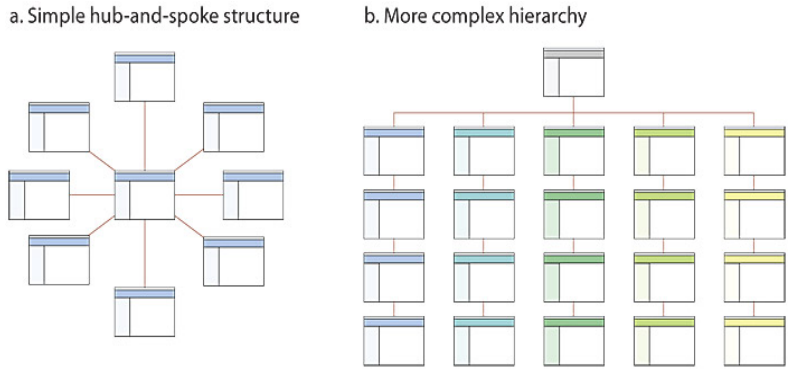
a. Straight linear sequence

b. Linear sequences with supporting digressions

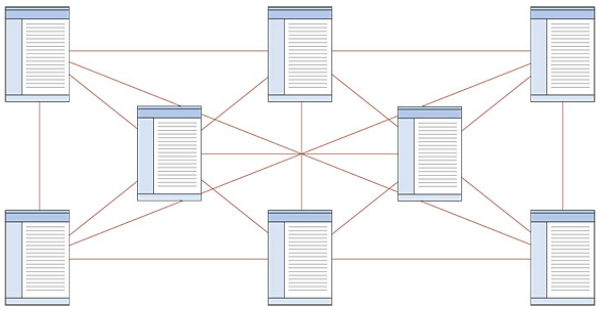


continued…

- *hierarchy structure*
  - simplest form of hierarchical site structure is a star, or hub-and-spoke where navigation tends to be a simple list of subpages, plus a link for the home page (fig 3.5a).
  - best way to organize most complex bodies of information
  - easier to understand
  - practical only with well-organized material.
  - most web sites adopt some form of multitier hierarchical or tree architecture which has an arrangement of major categories and subcategories
    - powerful advantage for complex site organization in that most people are familiar with hierarchical organizations, (fig. 3.5b).



- *Web like structure*
  - pose few restrictions on the pattern of information use
  - mimics associative thought and the free flow of ideas, allowing users to follow their interests in a unique, heuristic, idiosyncratic pattern
  - develops with dense links both to information elsewhere in the site and to information at other sites
  - can just as easily propagate confusion
  - often the most impractical for websites because they're hard for the user to understand and predict
  - work best for small sites dominated by lists of links and sites aimed at highly educated or experienced users not looking for a basic understanding of a topic (fig. 3.7).



A I T

- usability
  - the ease of use and learnability of a human-made object.
  - usability refers to how all people can use the software or digital product,
    - how user friendly the product is to use
    - include a menu system that is logical and predictable
    - choose names for menus that are logical and predictable
    - use a search facility
    - provide user feedback when they are waiting, *i.e. something to indicate not to click away or leave the page.*
    - the product needs to be usable on different devices
    - make the site usable for many clients; have a choice of language or translation
    - make the product accessible

- accessibility
  - refers to the design of products, devices, services, or environments for people with disabilities
  - W3C clarifies web developments with accessibility in mind; such as the following.
    - use text alternatives to images, so text readers can help other forms people need, *e.g. braille, simpler language*
    - provide an alternative for audio only information; text or script, subtitles
    - provide an alternative for video only information; transcript, text, subtitles
    - make it easier for people to see and hear the content; use readable fonts at least 14 points, use good contrast
    - do not provide content that may cause people to have seizures; flashing < 3 times a second, small flash area
    - navigable; use techniques to help people know where they are on the website; breadcrumbs, menu system
    - predictable; make web content operate in expected ways
    - readable; make the text readable and understandable; include font size increase facility, larger fonts

- user experience (UX)
  - understand who your users are
  - user experience analysis is before user interface creation. Design with user experience in mind. After that, the user interface will be more appropriate
  - make your website easy and enjoyable to use
  - design to user's previous experiences, if there is a menu system, make it based on successful menu systems, items in one location (not spread out all over the page)
  - make the most important features, the easiest to find
  - conduct user testing for ease of use
  - after testing revise the product
  - after testing retest again with more than 2 or 3 people

- user interface (UI)
  - the user interface must be user friendly
  - (online software that uses text/images to create story) is the process predictable?
  - provide hints and tips
  - provide a FAQ
  - at startup have a short video tutorial, which they can 'Skip'
  - at startup have a numbered list for expected steps to complete, or clear and simple instructions

Skills

- choose an appropriate project management approach for the development of the chosen digital solution
- develop processes and documentation to build a project brief(s)
- plan a digital solution project in detail
- apply project management techniques to meet client requirements when creating a digital solution
- produce draft design plans/drawings to represent concepts
- use appropriate functionality tools to create visual layouts

AIT

Managing data

Knowledge

- security techniques for the management of data, including:
  - a disaster can cripple a business therefore it is important that companies have a disaster recovery plan and an audit trail to restore operations as soon as possible
  - disaster recovery plan
    - a set of steps to protect data in the event of a disaster, usually in writing
    - minimise data loss and down time
    - includes storing data off-site
    - hot site
      - this is a duplicate of the existing site in every way, servers, rooming, real time synchronisation so data is the same
      - following a disaster, this site is up and running for a short time *e.g. 2 hours*
      - advantage -- ready to go and is the best recovery solution
      - disadvantage -- very expensive to setup
    - warm site
      - this is a site that has computers set up, but not exact duplicates
      - following a disaster, this site is up and running for a longer time *e.g. a week*
      - advantage -- not as expensive as the hot site
      - disadvantage -- down time to get site operational
    - cold site
      - not configured with computers/other hardware, some more setup than others
      - advantage -- much cheaper than the hot or warm site
      - disadvantage -- more down time, more time needed to get up and running
  - audit trail
    - provides how the data comes into, or leaves, the company
    - the financial trail is different from the marketing trail when it comes to data

- types of backup techniques and archiving of data
  - full
    - duplicate of your existing data storage system
    - takes up the same amount of space (unless compressed)
    - advantage: can restore your data from one location
    - disadvantage: slow and takes up lots of space
  - differential
    - looks at the files that have changed since the last full backup and only backs those
    - one full backup and several differential backups – restore: full backup and last differential
    - advantage: not as much storage space needed, faster
    - disadvantage: slower than incremental because it is always looking back at the last full backup

continued…

- incremental
  - backs up only files that have been added or modified since the last backup of any type
  - to restore use the full back up, then also use the incremental backups of each day
  - advantage: fast
  - disadvantage: takes the most time to restore from the many backups taken

- daily
  - backs up only the files that have changed that day

- archive
  - a copy of files that are not needed on a daily basis
  - put onto different location and can be retrieved from the external storage system
  - advantage: frees up space on the normal storage location for daily use
  - disadvantage: may need to wait to get it from the archive location

- online data storage methods
  - saving data online is convenient, especially if you use different devices in different locations

- data warehouses
  - a data warehouse collects, stores and manages large amounts of data
  - to do analysis on that data (data mining) for financial or other gain
  - often contains large bank of very modern, high end computers with a large database, and software called OLAP database.
  - users can access this data from the central data warehouse, or from data marts

- data marts
  - a collection point within a data warehouse (often 40-50, each offering different data)
  - usually has data for a specific topic

- data in the cloud
  - storing data in the cloud requires an internet connection, a username and password and for the user to accept a user agreement
  - examples of cloud storage are *Google docs, OneDrive, Dropbox, iCloud, Facebook and more*
  - the cloud is actually a collection of servers that store and transmit data
  - can upload and download your files
  - ADVANTAGES
    - no need to buy the software
    - can be used from any device with an internet connection
    - updates transfer automatically across devices *e.g. calendar, email, notes, messages*
  - DISADVANTAGES
    - security problems
    - privacy issues
    - ownership of your data

continued…

AIT

- purpose of data mining
  - done by business, for business use
  - finding the data from a large collection of data
  - to find the information, analyse it and then gain financially from it
  - the process of finding information in a data mart or data warehouse
  - a source of business intelligence
  - data mining can help business work smarter
    - COMMON USES:
      - after the 9/11 attacks in the USA, the US government analysed data from the internet, emails, text messaging to identify who did the attacks - so used by governments to get information to stop terrorists
      - it is also used by the police to prevent major crime, *e.g. for the Sydney Olympics in 2000 police monitored internet activity for criminal action*

- processing of data considering security of data through the use of
  - data security is hiding your data from other people.
  - it is protecting your data so only authorised people can see it.

- passwords
  - a password is used to protect data
  - online accounts need a username and a password *e.g. Hotmail, Gmail, bank accounts*
  - keep track of your passwords for each time you start an online account, always email yourself 3 things: username, password, web address
  - don't use words in the dictionary for passwords
  - have a system for making your password, *e.g. My House is in Smith St becomes mhiiss*

- firewalls
  - a firewall is a barrier to prevent harmful programs getting to a computer
  - a simple firewall is turned on to prevent access to the computer from the internet
    - can also filter information from the internet *e.g. a proxy server in a computing network*

- biometrics
  - in data security it is the use of parts of the human body to assist access control
  - fingerprint, facial recognition, (eye) iris recognition, hand geometry (the shape of hand/length of fingers), voice recognition

- anti-virus software
  - large companies use anti-virus malware to prevent data loss *e.g. Symantec, McAfee, Norton*
  - this software detects intruder programs, based on a list of intruder programs on its server
  - each time a new intruder program (or virus) is found, it is added to the server
  - individuals also use anti-malware software to protect data
  - large companies also use malware which encrypts files to protect them, *e.g. encrypts emails before they're sent*

continued…

- digital signatures
  - used to make sure a document hasn't been touched or altered while emailed or transferred
  - used by software companies to make sure their online software is not tampered with
  - it uses encryption via public and private keys (these are long strings of letters which are added to the document)
  - if someone tries to alter a document with a digital signature, they can't re-create a valid digital signature. The reason for this is because the intruder cannot know the private key made at document creation
  - for it to be successful, the public and private keys must be matched

- digital certificates
  - online shopping companies, schools, and others use digital certificates
  - these are kept on your computer and when you link to the location *e.g. Woolworths online, the digital certificate is matched to the online version. If it matches you can connect.*
  - digital certificates use public keys and digital signatures

- encryption
  - the translation of a file or document into a secret code
  - the only way to read the file or document is to have the secret code.
  - putting it into the secret code is called encryption
  - reading it from the secret code is called decryption
  - if encrypted, it is called cypher text
  - if not encrypted, it is called plain text
  - encryption can be used when transferring a file, it can also be used when storing a file
  - it is becoming popular with more people worried about data security
  - you can use encryption software to protect your data, but it can slow down your work procedures quite a lot
  - just browse encryption software

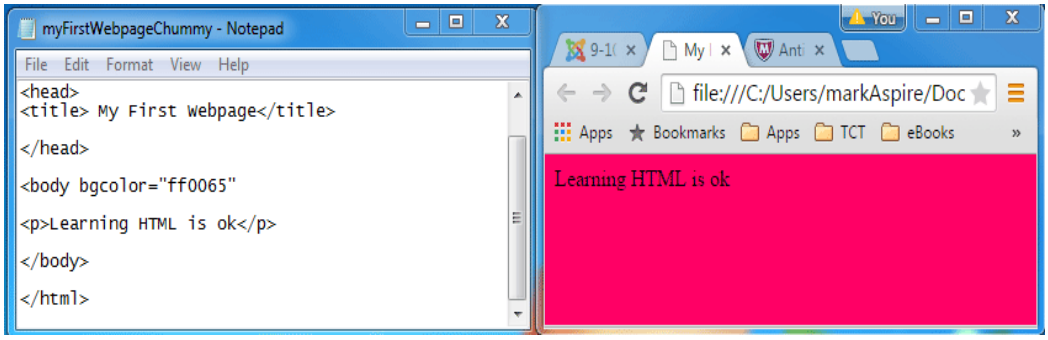
- concept of user-generated content
  - user generated content is people uploading their ideas to the web for others to see
  - personal (or business)
    - blogs
    - chats
    - wikis
    - discussion forums
    - tweets
    - podcasts
    - pins
    - images
    - videos
    - audio files
  - business only
    - companies ask the public to contribute to ideas
    - basic level is reviewing a product online
    - complex level is submitting your home made video of a paper version of our 'car' doing interesting activities

AIT

- advantages and disadvantages of user generated content
  - advantages
    - information is categorised, so it is easier to find, *e.g. different blogs*
    - review of products helps people looking to buy that product, or not
    - businesses: if they can get the public involved in their company, more profit for business
    - keeps a website up to date
    - provides free content when people keep putting up their ideas
  - disadvantages
    - some negative feedback
    - some obscene or rude feedback
    - flaming can occur if someone disagrees with comments by another person

- concept of hypertext markup language (.htm/.html)
  - standard language to make webpages
  - tells the browser how to put the webpage together *i.e. how to set out the text, images, etc.*
  - Tim Berners-Lee invented HTML in 1990
    - Tags
      - it works on a tag system, which browsers use to put a webpage together
      - the tags are in angle brackets, but the tag itself doesn't get displayed on the webpage
      - most tags have a start <> and a finish </>, *examples below*
        - *<html>start of webpage, end of webpage </html>*
        - *particular font and style*
      - some tags don't need an end tag
        - *
 insert a blank line. no closing tag needed*
      - *<!--this is a comment. it won't show on the webpage, but is used to describe what the code does-->*
      - html has different versions, HTML -1990, HTML2 - 1995, HTML3 -1997, HTML4-1999, HTML5 -2014

    - How a Browser Puts a Webpage Together
      - web browser looks for a html opening tag and then a html closing tag.
      - if it finds these two it will display a page, laid out based on the html tags in the webpage.
        - Note: In HTML5 onwards the closing tags are different



AIT

- concept of Web 2.0 and Web 3.0
  - Web 2.0 is two-way traffic. People put information for other to see, but now people can also respond and put up their own information. The data is uploaded and downloaded
    - has focus on user-generated content
    - social networking is web 2.0
    - users can interact by commenting or uploading and hitting submit
    - common features:
      - self publishing
      - sharing content
      - adding opinion
      - writing a review for a product
      - anyone can participate
      - many content creators
    - *examples: blogs, wikis, Facebook, Wikipedia, Curating with RSS*

  - Web 3.0 or the "semantic web" – STILL BEING DEVELOPED
    - tailor-made internet for the user
    - each web search that you make, gives web 3.0 information to learn more about you which can help your web searching
    - 2015 we started to see ads relating to previous search content
    - browsers are being built that will analyse your search content and be able guess or answer your search
    - advertising is likely to be the biggest money spinner for Web 3.0 in the short term

- purpose and features of content management systems (CMS)
  - a Content Management System (CMS) is web-based software (or website) that allows users to interact with a website for a specific purpose
    - all content stored in one place
    - commonly used in high schools as an intranet for students to collect or submit work
    - Moodle is a common content management system
    - Other CMS include Blackboard, D2L , Instructure Canvas, SEQTA
  - alternative:

    Learning Management Systems (LMS)
    - a training system
    - can track progress of individuals through a learning paths

- purpose of world wide web consortium (W3C)
  - to set web standards
  - web standards anywhere, anytime
  - web standards for desktop, mobile devices, interactive TVs, yes even cars

A I T

- features of W3C
  - HTML and CSS
    - HTML and CSS are the fundamental technologies for building Web pages: HTML (html and xhtml) for structure, CSS for style and layout, including WebFonts.
  - JavaScript Web APIs
    - standard APIs for client-side Web Application development include those for Geolocation, XMLHttpRequest, and mobile widgets. W3C standards for document models (the “DOM”) and technologies such as XBL allow content providers to create interactive documents through scripting.
  - graphics
    - W3C is the home of the widely deployed PNG raster format, SVG vector format, and the Canvas API. WebCGM is a more specialized format used, for example, in the fields of automotive engineering, aeronautics.
  - audio and video
    - some of the W3C formats that enable authoring audio and video presentations include HTML, SVG, and SMIL (for synchronization). W3C is also working on a timed text format for captioning and other applications.
  - accessibility
    - W3C’s Web Accessibility Initiative (WAI) has published Web Content Accessibility Guidelines (WCAG) to help authors create content that is accessible to people with disabilities. WAI-ARIA gives authors more tools to create accessible Web Applications by providing additional semantics about widgets and behaviors.
  - internationalization
    - W3C has a mission to design technology that works across cultures and languages. W3C standards such as HTML and XML are built on Unicode, for instance. In addition, W3C has published guidance for authors related to language tags bi-directional (bidi) text, and more.
  - mobile web
    - W3C promotes “One Web” that is available on any device. W3C’s Mobile Web Best Practices help authors understand how to create content that provides a reasonable experience on a wide variety of devices, contexts, and locations.
  - privacy
    - the Web is a powerful tool for communications and transactions of all sorts. It is important to consider privacy and security implications of the Web as part of technology design. Learn more about tracking and Web App security.
  - math on the web
    - mathematics and formula are used on the Web for business reports, education materials and scientific research. W3C’s MathML enables mathematics to be served, received, and processed on the World Wide Web, just as HTML has enabled this functionality for other types of content.

A I T

- purpose of W3C conventions
  - to promote clear understandings of the above features
  - One example if the standards are followed...
    - *It will allow accessibility - web for all ...*
      - due to providing web content accessibility guidelines for developers, there will be...
        - text alternatives for images
        - captions for audio and video
        - use sufficient contrast for readability
        - help users avoid mistakes

- validation techniques for online forms
  - When people used to submit forms on the internet, they used to make mistakes. Nowadays the mistakes don't happen so often because web creators now use data validation techniques.
  - Techniques:
    - check to see if the data is in the correct format
      - *e.g. for an email field; is an @ symbol and domain present*
    - check for duplication *e.g. creating an account displays username availability*
    - check for completion of essential details *e.g. some forms have an asterisk * for essential fields*
      - for essential details it is a good idea to put it in twice *e.g. choose password, re-type password*
  - validation feedback
    - if validation fails, the user should be given clear help to identify the error *e.g. a red box around the mistake*
    - the error can also be a pop up tool tip, or a change of colour of the field
    - can occur once the submit button is clicked
      - can occur in real-time, while the user is filling in the field

Skills

- analyse sources of information for verifiability, accuracy and currency
- test and evaluate online applications for browser compatibility and apply W3C as relevant

AIT

Networks

Knowledge

- types and characteristics of communication protocols, including:
  - for a network to work correctly it needs to have rules to make the system work.
  - these rules are called protocols - *for example, when you type in a web address, it is the HTTP protocol that is working*
    - a protocol is a set of rules that allow a computing device to communicate with another computing device

- transmission control protocol/internet protocol (TCP/IP)
  - the standard to connect to a web server
  - the standard that divides your expected webpage into smaller 'packets'
  - gives an address for each packet
  - the standard for receiving a webpage
  - it does error checking to make sure none of the packets are missing
  - it reassembles the 'packets' into the correct sequence for the expected webpage
  - now the browser is ready to display the webpage, BUT, we need HTTP for that

- hypertext transfer protocol (HTTP)
  - is the standard to transfer hypertext
  - HTTP is the request, response protocol
  - a client requests via typing http... into the web address bar
  - if the web server can proceed with the request (*the address is correct)* it will send the page
  - if the server cannot proceed with the request (*the address is wrong)* it will send an error page

- hypertext transfer protocol over secure socket layer (HTTPS)
  - is the standard to transfer hypertext, but with a secure connection
  - it is secure because data passes within a connection encrypted by SSL
  - a web server will authenticate to see if the password, called a digital certificate public/private key matches,
  - if this key setup matches, it remains secure and you can get into the webpage

- wireless application protocol (WAP)
  - is the standard to access data over a mobile wireless system
  - it can access all operating systems, on all mobile devices *such as smartphones, tablets, laptops*
  - Wireless Markup Language (WML) delivers the content to the smaller display screens
  - WML is similar to HyperText Markup Language

A I T

- types and characteristics of communication standards, including:
  - 802.11x (wireless)
    - 802.11a Wi-Fi
      - Advantages = low cost, good signal, range 35m indoors, 120m outdoors
      - Disadvantages = slow speed, some interference, can't work with 802.11b
    - 802.11b Wi-Fi
      - Advantages = faster than 802.11a, little interference, range
      - Disadvantages = high cost, shorter range or length of signal, can't work with 802.11a
    - 802.11g Wi-Fi
      - Advantages = faster than 802.11b, good range, can work with 802/11b
      - Disadvantages = higher cost than 802.11b, some interference
    - 802.11n Wi-Fi
      - uses multiple signals and antennas
      - MIMO Multiple Input, Multiple Output with 4 spatial streams
      - Advantages = fast speed, best signal range of length of signal (max 100m), little interference
      - Disadvantages = cost more, can interfere with 802.11b and 802/11g
    - 802.11a/c Wi-Fi
      - MIMO with 8 streams each of width 80 MHz
      - uses beamforming to direct signal to improve communications, uses smart antenna which track the device
      - Advantages = can work with 802.11g/802.11n, very fast, range max 50m,
  - 802.3 (Ethernet)
    - 802.3 10Mbps
      - standard Ethernet
      - commonly uses twisted pair
    - 802.3 100 Mbps
      - Fast Ethernet
      - Cat 5 twisted pair cable or fiber optic (not coax)
    - 802.3 1 Gbps Mbps
      - Gb Ethernet
      - uses full duplex operation with dedicated pairs for transmission and receive
      - need to have full-duplex NIC
      - must use a switch (not a hub)
    - 802.3 10 Gbps
      - 10Gb Ethernet
      - maximum distance covers 300-400 meters
      - full duplex mode only
      - uses optic fibre only

A I T

- types of network security measures
  - For a network to work correctly, it needs to be secured against attack.
    - If you have auto login on a device, disable it

  - firewalls
    - can be a server that filters incoming data from blacklisted IP addresses
    - can be a proxy server, the gatekeeper for what packets of data get in or out
    - can be software on your computer to protect who accesses your computer
    - you can ban certain protocols, *e.g. File Transfer Protocol (FTP) which can upload dangerous files to computers*

  - passwords
    - is an access code to get into a computer or device
    - better passwords are NOT just dictionary words *e.g. 3nter*
    - better passwords are longer passwords, the longer the better*, e.g. 15 characters or more will take a long time to crack*
    - if you have important data, use a strong password, *e.g. !Liv3@al0velyPlAce = Iliveatalovelyplace = I live at a lovely place*
    - don't use a password that is a family member or pet

  - physical security
    - stop anyone from getting into the building
      - keep the doors locked
    - stop anyone from taking the computer
      - use a lock down system with a cable

Skills

- design a LAN
- justify the design of a LAN

AIT

Impacts of technology

Knowledge

- data and information security related to personal or sensitive information
  - The increase of mobile devices, fibre optic networks and terabytes of data moving around the internet has led to the ability for personal data to be spread into places never before imagined.
  - Personal Information
    - is information or opinion that can be linked back to an individual
    - is private details *such as date of birth, address, work place, email address*
  - Sensitive Information is information or opinion about…
    - race or ethnic origin
    - religious beliefs
    - criminal record
    - health details
    - bank details
  - Data and Information Security
    - At the individual level…
      - consider what you post
      - privacy settings
    - At the business level…
      - who is in control of your data (Facebook have rights to use posted photos)
      - cloud computing means data is now no longer stored locally
      - what privacy laws are applicable to your data in that country

- purpose of a code of conduct
  - to prevent physical harm
  - to prevent embarrassment
  - to protect privacy
  - to prevent stalking, hacking

- elements of a code of conduct, including:
  - work hours
    - The hours to be worked are documented. This would include work breaks
    - The location of these may also be debated with some working from home, also documented
  - employee email use
    - The employer provides an email system for work purposes
    - How much of this is used by employees for private use will vary
    - Some employers understand this and turn a blind eye to it, or others may allocate authorised use during break times. It will be in the code of conduct

continued…

A I T

- employee internet use
  - The employer provides internet use for work purposes
  - How much of this is used by employees for private use will vary
  - Some employers understand this and turn a blind eye to it, or others may allocate authorised use during break times. It will be in the code of conduct

- employee privacy
  - The hours to be worked are documented
  - The location of these may also be debated with some working from home, also documented

- employer's monitoring of work emails, internet access and computer use
  - Employers are always very keen to run business as efficiently as possible
  - If a business has 10 employees and they are often on the internet for non-work related topics then, in theory they are losing productive work time from those employees

- online censorship of information in a global context
  - Internet censorship is the control or suppression of what can be accessed, published, or viewed on the Internet. It may be carried out by governments or by private organizations at the behest of government, regulators, or on their own initiative.
  - How is it done?
    - Censorship is done by controlling Internet Service Providers.
    - It is done by IP Address blocking and/or domain name filtering, to name 2 of the many methods.
    - As of 2015, only North Korea and Cuba still have total censorship of the internet. This is changing.
    - Other countries have, or are in the process of creating laws for what censorship to put in place.
  - Why Censor the Internet?
    - There are many categories of information on the internet
    - Pornography, gambling sites, chat and many others that have content that can cause great discussion.
    - Child pornography is a highly controversial topic.
      - this is an example of the internet allowing crime to continue; by image circulation or 'Chat' for predators to meet young kids
    - Even the idea of free speech being used on the internet goes against what some countries see as wrong.
    - The idea of censoring or preventing some aspects of the internet is a worthy one to a degree.
    - One may argue that it is a right for individuals in a country to have open access to the internet.
    - Others may argue that it is right for the country to prevent ideas that go against the government wishes.

A I T

- issues with the use of cloud computing
  - The cloud offers ready access to many resources for so many people.
  - It reduces both hardware and software operating costs for business and private users.
  - It is very convenient to access it on multiple devices.
  - But what is the real cost of saving data online, and using online applications.

- confidentiality of data
  - Confidential means, meant to be secret.
  - If your data is saved on your home computer, you know it is relatively safe.
  - If your data is saved in the cloud, you don't know if it is safe or not.
  - It is the same with business. If stored locally, they know it is mostly safe.
  - If business store in the cloud, then there are many questions that can be asked.
  - Is the data safe from unauthorised people looking at it and possibly using it?
  - The Cloud Service Provider (CSP) may analyse client data.
  - Hackers may get into the data and analyse it for business secrets and the like.
  - People need to consider where they place confidential or secret data.
  - Businesses need to consider if the cloud storage solution they are using is secure or not.

- sensitivity of documents
  - Data stored in the cloud is important.
  - Some are more important than others.
  - *For example, the secret business plans for Holden's latest model car.*
  - Patient records for hospital systems are sensitive and their storage needs to be different from that of a blog post for kid writing about his BMX race on the weekend.
  - The more sensitive the document, the more care needs to taken to keep it safe.

- level of accessibility
  - access to the data, means who can get to the data.
  - a matter of going to a website and collecting the information
  - whether people need to login
  - Google docs uses the login method. So does Facebook, Twitter and many more.
  - the more valuable the data is; the more care needs to be taken to keep it safe.
  - need to have secure passwords and consider unauthorised access as a way of cloud life.
  - businesses need to consider reliable and secure cloud computing services

- availability of online applications
  - The more online applications we have, the more online data we have.
  - 10 years ago there were hardly any online applications. Now we have 1000s to choose from.
  - can use online applications *such as social networking to keep in touch with family and friends.*
  - business can choose from 100s of online storage applications.
  - The more data that is stored online, the more opportunity for criminal activity *such as theft and fraud*

A I T

- impact of digital technologies and global markets on:
  - productivity
    - Global markets provide more opportunities for consumers.
    - Apple's global productivity has picked up as result of digital technologies. Sales of the iPhone are carrying the company to record sales profits.
    - Technological improvements in farm machinery, mean that farmers can buy tractors that can be driven remotely to seed or plough a paddock. This will improve productivity for the farmer.
    - Improvements in educational opportunities via online learning improves the productivity of graduates from universities. Lessening the need for university professors.
    - Improvements in medical diagnosis equipment *such as a MRI, means improved productivity for the health industry.*
    - Digital analysis of business statistics can point out areas where costs can be made and where cutbacks should occur.
    - Computer analysis of production samples can assist purity for minerals *such as gold and iron ore assisting productivity.*
    - Computer analysis of DNA in police forensics is advancing so that criminals can be caught and bodies identified which has improved policing productivity

  - access to knowledge or resources
    - access to learning;
      - 24/7 access to…
        - university and courses online, cheaper method of getting a degree, less travel,
        - students in schools, improved results with constant feedback for improvement opportunities
        - information on a plethora of topics. Enlightened population.
    - access to entertainment
      - 24/7 access to…
        - movies on demand and online games
    - access to work
      - 24/7 access to…
        - work extranets
        - work cloud storage, convenient
        - email and work from home; great for workaholics, not so good for family time
    - access to online purchasing
      - 24/7 access to…
        - eBay and gumtree style of websites
        - a plethora of items for purchase and an opportunity to spend too much
    - access to family and friends
      - 24/7 access to…
        - social networking to share news and events
        - Improved communication for families but easy access for cyber bullying
    - access to online gambling
      - 24/7 access to…
        - losing money and possibly a marriage as well.

continued…

- outsourcing
  - outsourcing is getting other companies to do some of a company's normal business activity.
  - improvements in digital technologies and availability of global markets assist this to happen.
  - *for example, Telstra, Optus and many other companies have outsourced a lot of customer support off shore.*
  - an impact of this is that local jobs in Australia are lost.
  - security of company details could be lost if off shore. Privacy laws in Australia are not relevant in other countries so privacy is a large issue.
  - quality control of services is up to the whim of the company conducting the outsourcing. The concept of trust is very important and should be based on successful past performance. The large companies are more reliable, but what of the smaller ones who are cheaper??
  - company projects could be copied and sold on as their own causing copyright and licensing issues.
  - hidden costs of communicating on unreliable networks depending on location of outsourcing company. Ideas could be lost in the translation of the ideas.
  - the reputation of the company is in the hands of a different company.

- impact of Web 2.0/Web 3.0 on the use of digital technologies

A I T

Application skills

Knowledge

- how digital communication is used for educational purposes
  - digital communication has changed for teachers and administrators and students
  - there are advantages and disadvantages for this
    - virtual learning environment
      - uses a computer or mobile device
      - a portal is a password protected
    - how teachers use digital technologies
      - provide learning to students via a portal 24/7
      - content to be learnt, games or activities, discussion forums or quizzes
      - learning pathways to web resources, *e.g. codeacademy.com*
      - share collaborative documents *e.g. google docs*
      - upload of assignment locations to students
      - online assessments to students
      - communicate to parents and students via email or messaging
      - do reporting and assessment online
    - how students use digital technologies
      - students use digital technologies to socialise
      - also use digital technologies to access virtual learning environments
      - collect learning concepts from teachers
      - collaborate using online forums
      - submit assignments and other work through portals
    - how parents use digital technologies
      - communicate to teachers via email and messaging
      - observe student progress through school portals
      - receive text messages when students are absent
      - book parent/teacher interviews online
  - advantages of digital technologies in education
    - lots of resources available to the classroom
    - 24/7 availability of resources
    - student input is greater via discussion forums
    - it is possible to get education online *e.g. certificates, diplomas, degrees*

continued…

- disadvantages of digital technologies in education
  - an internet connection is essential, if it fails so does the learning
  - students get distracted by game websites preventing learning
  - health problems from too much computer use; *e.g. eye strain, hand repetitive strain injuries*
  - digital divide leads to lack of opportunity for students without computing resources

Skills

- use available functions of online software
- use online tools for tutorials/learning
- use forms for online data collection

AIT

Project management

Knowledge

- concept of service level agreements
  - a Service Level Agreement is an agreement in writing between 2 organisations for one to provide the other with a quality service
  - components in a SLA are time period, who it is between, signatures of each, date, what service to be offered, times available, penalties if service is not provided within a given timeframe.

- features of service level agreements, including:
  - availability of service
  - type of services
    - *e.g. a help desk service, which is or outsourced to a help desk specialist (overseas or not*) can offer:
      - business hours telephone support from 8.00am - 5.00pm
      - extended hours support from 5.00pm - 10.00pm
      - email support with a response within 24 hours
      - email support with a response within 2 hours

- advantages of local and global outsourcing compared with in-house production
  - cheaper employment brings down operating costs.
  - specialist help. These companies can become experts at providing this service.
  - a company can focus on core business.
  - upskilling workers in an IT company can be costly. Outsourcing can keep employee costs down.
  - staff flexibility. You can stop outsourcing when business slows down. You can start outsourcing when business picks up again

- purpose of outsourcing data management
  - outsourcing data management services are in the image below from outsource2 India

  - main purpose is cost saving of staff and other business overheads
  - but with these advantages come some risks
    - storage location may be unknown
    - there may be unauthorised access to the data
    - privacy may be lost
    - the data may be lost

A I T

- evaluation of software, including usability
    - usability testing
        - this is done by a large software company to check if the software works.
        - test individuals work through set tasks in testing the software
        - large companies would record them as they test the software to gain useful data
        - this data is analysed to identify problems with the software
    - beta versions
        - a company will sometimes release a 'first' version of the software, usually free
        - users will use the software and provide feedback to the company
        - the company will then release a 'final' version of the software
    - problems with software
        - after testing, problems are identified
        - they are fixed
        - in this process and due to mistakes, it is very rare that software always does everything as designed.
    - software updates
        - companies send out updates to their software which is a 'fix-it' system for errors or improvements in the software.

Skills

- apply project management techniques to meet client requirements
- apply a design process to create a digital solution
- use appropriate tools to evaluate the effectiveness of a digital solution in accordance with the design brief
    - surveys
    - client feedback
    - self-reflection