YEARS 11&12

INFORMATION SYSTEMS AND DIGITAL TECHNOLOGIES
TEACHING AND LEARNING SUPPLEMENT

INDEPENDENT SCHOOLS TASMANIA

TASMANIAN CATHOLIC education office

Tasmanian Government

Teaching and Learning Supplement
INFORMATION SYSTEMS AND DIGITAL TECHNOLOGIES (ITS315118)

ADVICE TO TEACHERS

This document helps to describe the nature and sequence of teaching and learning necessary for students to demonstrate achievement of course outcomes.

It suggests appropriate learning activities to enable students to develop the knowledge and skills identified in the course outcome statements.

Tasks should provide a variety and the mix of tasks should reflect the fact that different types of tasks suit different knowledge and skills, and different learning styles. Tasks do not have to be lengthy to make a decision about student demonstration of achievement of an outcome.

COURSE SPECIFIC ADVICE

This Teaching and Learning Supplement for *Information Systems and Digital Technologies* Level 3 must be read in conjunction with the *Information Systems and Digital Technologies* Level 3 course document. It contains advice to assist teachers delivering the course and can be modified as required. This Teaching and Learning Supplement is designed to support teachers new to or returning to teaching this course.

Information Systems and Digital Technologies allows learners to develop an understanding of how organisations manage, use and organise data to solve a range of information problems.

SEQUENCE OF CONTENT

Information Systems and Digital Technologies Level 3 is divided into 6 compulsory units of study

1: Describing Information Systems (15 hours)
2: Project Management (including the Project Lifecycle) (20 hours)
3: Systems Development Lifecycle (20 hours)
4: Social, Ethical and Legal Issues of Information Systems (15 hours)
5: Design Develop and use the Tools of an Information System (30 hours)
6: Applied IS&DT Case Study (Major Project) (50 hours)

COURSE DELIVERY

The order in which the first 5 sections are approached is not prescribed, but the Major Project relies on the skills, knowledge and understanding from the other sections.

1: Describing Information Systems

Describing Information Systems	*Examples of learning activities* Learners:
	identify and apply elements of survey design– clarity, removal of ambiguity and duplication, ease of use, reducing unnecessary work by respondents, data validation checks and verification, testing etc. – as part of a survey design task,
	present their findings in a class presentation highlighting the four components of information systems,
	produce an explainer animation showing the key findings of a survey,
	develop a mindmap showing how information is important to an organisation and the relationship between information and organisational functions,
	compare different data collection techniques – structured interviews, online surveys, paper-based instruments, etc., presented as an infographic,
	compare and contrast feature set of different online surveying tools – data validation, adaptive questions or flow control, raw data vs summarised or processed data,
	develop a case study presented with video interview or interactive multimedia components,
	maintain a journal of Information Systems issues in the media via personal student blogs – over several months there are often IS-related stories related to systems failures or breaches, cost and time over-runs, examples of innovation and benefits to people, success stories etc.,
	create a case study highlighting problems faced by people with a disability when using an information system – direct interview or meetings with people who have disability related to vision, colour perception, manual dexterity, memory, intellectual functioning, etc.,
	create a spreadsheet model to compare alternative solutions for workplace computers for a specified scenario,
	use an online document storage tool, blog or similar tool to progressively record information for research reports,
	curate a collection of social media resources relevant to information systems failures, their causes and consequences,
	analyse scenarios that involve bulk loss of information belonging to an organisation or individual and forecast the effect this would have on the organisation/individual.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

Learners may need support in identifying a suitable organisation or group of individuals for the research investigation. Family and local connections are often a good source of contacts.

While the research investigations are individual, learners will broaden their knowledge by seeing the investigations of others, and where possible this sharing should be used to advantage.

WORK REQUIREMENTS

Data

Interview: design and document a structured interview process for use with an organisation or individual using an information system. (20 interview questions)

Presentation: after conducting the interview, produce and deliver a 10-minute presentation (supported by appropriate presentation software) that highlights the role of the four components of information systems in the context of the organisation or individual.

Equipment (software and hardware)

Research Investigation: design and specify (with justification) a workplace computer system for a specified client scenario. (1500 words)

Research report: a topic relevant to software and hardware issues in contemporary information systems. (1000 words)

Example topics include, but are not limited to:

- operating systems for workstations, portable and mobile devices
- Open Source vs commercial software
- integrated software suites vs dedicated software
- Software as a Service (SaaS) vs installed software applications
- Cloud Services vs locally hosted storage and application servers
- accessibility of information systems (including usability for general users and for those with vision or colour perception limitations, responsive design for different devices and legal/policy issues).
- People, Procedures

The equivalent of EITHER:

Case Study: role of information systems staff within a nominated organisation based on an industry excursion/incursion. (1000 words)

OR

Research Investigation: analysis of a historical or contemporary information system failure, and the role of procedures in that failure. (1000 words)
Historical examples include: Australian Census website failure; Heathrow airport shutdown; release of usernames and passwords on various platforms; and security breaches.

RESOURCES

Online and freely available tools and mobile apps for presentations, video production and surveying are constantly being developed and updated. Providers and learners are encouraged to perform a current scan to determine if the tools suggested below are still appropriate for their needs.

Presentation and graphical tools

Prezi https://prezi.com/

Biteable https://biteable.com/

Canva https://www.canva.com

Adobe Spark https://spark.adobe.com/

Microsoft Sway https://sway.com/

Polling and survey tools

Poll Everywhere https://www.polleverywhere.com/

Surveymonkey https://www.surveymonkey.com

SurveyGizmo https://www.surveygizmo.com

2: Project Management

TEACHING AND LEARNING

Project Management	Examples of learning activities
	Learners:

Learners:

produce a mindmap of project issues for a specified scenario,

produce a Gantt chart that shows possible milestones and resource allocation for a PM scenario,

produce and use a KanBan board for a PM scenario,

produce a Work Breakdown structure for a scenario,

produce an infographic of the PLC,

Illustrate the 4 components of the PLC with an explainer animation,

design and construct a CommonCraft-style video to describe the PLC to other learners.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

Project Management (PM) is a well-recognised academic and practical discipline in its own right.

Learners should learn sufficient about Project Management in this subject to be able to apply it in other parts of their current and future lives. The learning should include the principles, terminology, tools and application of traditional project management as well as exposure to contemporary approaches.

It is worth noting that the context of traditional PM is unfamiliar to many young learners who have, in general, not worked in large organisations with multiple teams and with specialists. In some cases, they may not immediately see the point of PM if they are used to working on their own on small tasks – the overhead of PM might seem unjustified. There is a need to convey the importance of project management in more complex environments, and at the same time show that it does have merit for managing personal projects.

Many contemporary project management approaches might seem highly attractive to learners, in particular the approaches often categorised as agile approaches. The flexibility of these models, short feedback cycle, and ready acceptance of adaptation can be appealing to young learners as it fits well with the approach they may have taken on personal projects where they effectively act in all project roles. Care needs to be taken that they understand the traditional approach to PM prior to exposure to contemporary flexible approaches.

Where possible, real project management tasks should be considered. While Information Systems projects are preferable there is value in applying the PM methodology to other projects, if they are relevant to the learners.

Case Studies or scenarios can support extended tasks in which learners address this section as well as others. For example, a case study of a business that requires a website could allow coverage of Section 2 Project Management as well as Section 1 Describing Information Systems.

Initially Case Studies may be best focussed on situations and scenarios that are familiar to the learners – this might include situations within the college or school, but ideally would be broader.

As learners gain skill in the concepts of project management the case studies can become more general and draw on examples from a range of areas of commercial and social activity.

WORK REQUIREMENTS

Learners will be provided with a scenario which describes a real-world project.

PM software Task: use a software tool designed for an aspect of project management to represent the relevant PM aspect of this scenario. Example tasks include, but are not limited to:

produce a mindmap of project issues for the scenario

produce a Gantt chart that shows possible milestones and resource allocation for the scenario

produce and use a KanBan board for the scenario

produce a Work Breakdown structure for the scenario.

Summary Sheet: summary of the four components of the PLC in relation to the scenario. (1000 words)

RESOURCES

Project management

Tasmanian Government project management templates:
http://www.egovernment.tas.gov.au/project_management/supporting_resources

A range of spreadsheet templates for Gantt charts is available eg https://www.teamgantt.com/free-gantt-chart-excel-template.

Online project management and special-purpose tools such as https://www.bitrix24.com, https://asana.com/ and https://freedcamp.com/ are also useful.

KanBanChi https://www.kanbanchi.com/ provides a KanBan tool.

Presentation tools

Canva for infographics https://www.canva.com/create/infographics/

Infogram https://infogram.com/

Ease.ly http://www.easel.ly/

Biteable https://biteable.com/

Adobe Spark https://spark.adobe.com/

3: Systems Development Lifecycle (SDLC)

TEACHING AND LEARNING

Systems Development Lifecycle (SDLC)	*Examples of learning activities*
	Learners:
	complete matching task that connects tasks with the appropriate component of the SDLC,
	investigate case studies of software development to identify the tasks that occur within each component,
	use a provided scenario to suggest or plan the tasks and steps within the SDLC,
	produce a structured document that describes tasks that might occur within the SDLC for a small software project,
	working as a group of 4, collaboratively develop a video or animation that shows each of the 4 components of the SDLC,
	uses a summary produced by another student to create a paper-based or online game or puzzle based on connecting tasks with the SDLC.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

The relationship between SDLC and the Project Life Cycle needs to be well-understood –this aspect has been raised in the examination reports for the previous IS&DT course. One way to approach this is to include projects that are not systems- or software-based, and how the PLC applies to them. Software and systems projects then have the additional SDLC component.

Care needs to be taken to ensure learners can recognise the SDLC within case studies, and go beyond general descriptions by explaining what activities would be undertaken within each of the 4 stages of the given SDLC model for a specific case study or scenario.

Learning tasks for this section can include tasks that focus on the specific components of the SDLC, the identification of parts of the SDLC within case studies or scenarios, and the application of the SDLC to new situations.

Identifying which activities occur in which stages is an important aspect of this section.

Historic or contemporary systems development can provide a basis for case studies, or familiar scenarios can be constructed. Where possible scenarios should be linked to solving a problem that is of interest or relevance to the learners

WORK REQUIREMENTS

SDLC Summary Sheet: learners produce a two-page document that summarises tasks that are typically encountered in the four components of the Systems Development Lifecycle. (1000 words)

RESOURCES

Presentation tools

Canva for infographics https://www.canva.com/create/infographics/

Infogram https://infogram.com/

Ease.ly http://www.easel.ly/

Biteable https://biteable.com/

Adobe Spark https://spark.adobe.com/

4: Social, Ethical and Legal Issues of Information Systems

TEACHING AND LEARNING

Social, Ethical and Legal issues of Information Systems	*Examples of learning activities*
	Learners:
	maintain a portfolio, blog, website or other digital collection of media articles related to current social, legal and/or ethical issues,
	curate a collection of social media resources related to social, ethical and legal issues related to information systems,
	manage the resources involved in their investigation of the social, legal and ethical issues of their chosen topic,
	present the findings of their investigation through a formal report,
	summarise aspects of the investigation via an online video, animation or explainer,
	create and undertake a role play based on the differing positions that can be taken on a social or ethical issue,
	compare the legal situation for a given topic in different countries (for example, the tracking of citizen behaviour, the expression of controversial views on social media, breaches of copyright on software or technology),
	engage in a debate on a social or ethical issue.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

This particular section of the course has the potential for students to apply skills and knowledge from the humanities, and has less emphasis on technical skills and knowledge.

Past experience, including examination reports from the previous version of this course, suggests that learners find it difficult to separate legal, social, and ethical issues. Consequently it is suggested that providers identify specific examples of such issues in technology environments, and make it clear why they are legal or ethical or social in nature.

Current events are often a source of relevant examples of unexpected consequences of information systems, and of intentional misuse of a range of technology. In some cases sensitivity to the personal lives of learners may be needed, for example when a family has been affected by misuse of technology.

Students could be asked to maintain (individually or in groups) an online portfolio of current social legal and ethical issues, which can then be used as a source of discussion. Similarly a historical collection is useful as a source from which to draw discussion topics.

WORK REQUIREMENTS

Learners will identify a current or historical topic involving an information system.

They will then analyse the social, ethical and legal issues associated with that topic. (1000 words)

As examples, the topic could include (but is not limited to):

- the information systems supporting or arising from a new or emerging technology, for example:
    - drones and remotely piloted aircraft
    - digital currencies
    - cloud-based data storage and processing

- o the sharing economy
        - o artificial intelligence
        - o algorithm-based trading and advertising
        - o wearable and embedded devices
        - o Internet of Things and sensor networks
        - o driverless passenger vehicles
        - o Big Data and data mining
        - o mass collection of personal information for medical and similar purposes
        - o human rights issues related to access to technologies
- unplanned consequences of the information systems underpinning social media, search technologies or other online services, such as filter bubbles, memes, online addiction and the Digital Divide
- intentional misuse of the information systems underpinning social media, search technologies or other online services, such as bullying, insurgency and extremism, and "fake news".

RESOURCES

Tools

Online reasoning tool– Kialo https://www.kialo.com/

Public online debate creator http://www.createdebate.com/

Sources of information

News archive (dated) on technology failures http://www.teach-ict.com/news/news_stories/news_computer_failures.htm

Filter Bubbles https://www.digitaltrends.com/social-media/fake-news-and-filter-bubbles/

Autonomous vehicles

https://www.accenture.com/au-en/insight-realising-benefits-autonomous-vehicles-australia-overview

https://www.technologyreview.com/s/609450/autonomous-vehicles-are-you-ready-for-the-new-ride/

Virtual currency https://www.moneysmart.gov.au/investing/investment-warnings/virtual-currencies

Algorithms – impact on life

https://en.wikipedia.org/wiki/9_Algorithms_that_Changed_the_Future

https://www.ted.com/playlists/323/the_influence_of_algorithms

Internet addiction https://www.betterhealth.vic.gov.au/health/healthyliving/internet-addiction

Internet Of Things https://www.gartner.com/technology/research/internet-of-things/

5: Design, Develop and Use the Tools of an Information System

TEACHING AND LEARNING

Design, Develop and Use the Tools of an Information System	**Examples of learning activities**
	Learners:
	research the features and suitability of software for specific purposes,
	acquire, install and configure software,
	test and evaluate acquired software,
	test and evaluate cloud-based software products,
	document feature sets of different software products intended to perform similar tasks (e.g., event management software)
	create a formal Test Plan for a proposed system,
	develop Test Plans for others to implement,
	engage in a critical analysis of a Test Plan developed by others, to identify its limitations,
	document the requirements for an information system to meet client needs,
	following site visits and fieldwork to a range of local businesses, develop an annotated visual display that describes the physical resources of local agricultural and/or horticultural systems,
	develop an information system by customising a spreadsheet program,
	develop an information system by customising a database management program,
	design a relational database and implement it in an RDBMS,
	use existing datasets,
	create their own datasets by generating, selecting, combining, filtering, and/or transforming other data,
	develop a website for an identified purpose using a web content management system.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

To some extent the best approach will depend on the background of individual learners. In some situations a whole-class approach may be best, or in other cases small groups or individual approaches may be appropriate.

The products and tools with which learners will become familiar will be influenced by their choice of Applied Information System Case Study, but a representative coverage of the most common tool types should be planned so that learners can make an informed choice.

While commercial software products are perhaps the most common in workplaces, the cost of these products may not be justified for the level of use involved in this section of the course. Where possible, free or open source products should be

considered, along with limited-duration accounts, evaluation versions and similar options. Increasingly, cloud-based applications will be available for many common purposes.

Installation of software may prove problematic where students use computers in a school, college or other semi-corporate environment. Alternatives such as applications that can be run from an external USB or hard drive may need to be considered.

Students may work in teams or as individuals, but the contribution of individuals must be identified as for Section 6.

WORK REQUIREMENTS

Design Development

Any two of:

System Task: develop a small information system using spreadsheet software and a new or existing dataset, making use of the functionality of the tool to produce an effective and usable tool for an end user. This could include the use of macros or the programming capability of the spreadsheet.

System Task: develop a small information system using database software and a new or existing dataset, making use of the functionality of the tool to produce an effective and usable tool for an end user. This could include the use of programmability within the software.

System Task: develop a small information system that uses a relational database. This should include at least one query, form, report and a custom user interface.

System Task: use a templated web tool, content management system or other appropriate technology to develop a website for a given real-world scenario.

Evaluation

Test Plan: create a formal Test Plan for a proposed system, in a form that can be used to guide the testing and record test outcomes.

RESOURCES

Learners may need access to software and online services with which to develop their small information system.

This could involve using software installed on local computers, software that runs on USB or external hard drives, free online tools, free hosting or online applications, or commercial hosted services. It also may require consideration of local ICT policies, web filtering and blacklisting/whitelisting, the nature of the data being stored (in particular, personal data), the security and protection of the data, and possible processes for de-identifying data.

Some possible tools (most of which are free or have a free version) include:

Portable software https://portableapps.com/apps a wide range of tools designed to run from an external USB drive or HDD without requiring installation.

Google Drive apps https://chrome.google.com/webstore/category/collection/drive_apps in particular Google Forms

Microsoft O365 , in particular the spreadsheet and forms

iCloud https://www.icloud.com/ as a general cloud storage facility

Wix https://www.wix.com/

Duda https://www.duda.co

Weebly https://www.weebly.com/

Obvibase https://www.obvibase.com/

Instant Wordpress https://instantwp.com/ (local version of wordpress)

Wordpress www.wordpress.com

Zoho Projects https://www.zoho.com/projects/

App building tools such as http://www.appypie.com/ and https://bubble.is/ (note: this is a fast-changing field and these are just examples).

Providers should regularly scan the available tools and technologies in order to maintain relevance and currency.

Learners themselves may identify specific and specialised tools related to their Case Study. For example a learner may choose to investigate event management systems, customer relationship tools, systems based on the Internet of Things, machine learning systems or health-related systems.

6: Applied Information System Case Study (Major Project)

Applied Information Systems Case Study	**_Examples of learning activities:_**
	Learners:
	develop and maintain a project journal,
	complete project documentation based on formal templates,
	undertake a feasibility study,
	set up and maintain a Risk Register,
	build and implement information system solutions
	develop and implement a Test Plan,
	develop documentation for the end user,
	develop a communications plan,
	use tracking tools to track project progress,
	provide status and closure reports.

SUPPORTING STUDENT RESPONSES AND ELABORATIONS

As this Major Project requires a considerable amount of student time, provision needs to be made for students to start on parts of the project early in the year. It is not recommended to schedule it to be entirely within the final block of time in the year.

Consideration needs to be given to support mechanisms to help learners develop self-management skills, particularly in relation to time management. There may also be a need to look at supporting individuals working within small groups to ensure that workloads and contributions are equitably allocated.

WORK REQUIREMENTS

Learners are required to undertake a Major Project which will require a high level of self-regulation and exploration of new aspects of information systems. The ability to explore, test, and learn from failure is important in this activity.

The Major Project will occupy approximately 30 hours of course time, and is underpinned by the relevant theory components. It is undertaken in small groups with learners undertaking roles within a project team.

The Project will be a balance between a) the project management and problem solving methodologies applied and documented, and b) the development of an information system using the SDLC to meet a client need.

Learners will maintain individual Project Journals that documents the date, description of activity, nature of activity, problems identified and subsequent task, for all work undertaken on the project. In addition project management documentation is to be produced as each stage of the project is undertaken, as below, and maintained by the project team.

This documentation should be based on the template documents provided through the Tasmanian Government Project Management Framework or equivalent.

As the Major Project is limited by the available time, these templates need not be used in their full form. Responsibility for creation and management of each section of the documentation is to be allocated within the project team.

The sections of documentation should include:

Initiate

- Major Project Proposal Feasibility Study

Setup or Planning

- Governance/Project Team – Terms of Reference
- Risk Management Plan/Risk Register
- Gantt Chart(s) showing project work plan
- Critical Path Analysis Diagrams
- PERT Chart(s)
- Communications Plan
- Testing Plan

Execution or Manage

- Stakeholder Engagement Plan
- Project Execution Plan
- Status Report

Finalise or Closure Project

- Review and Closure Report
- System Operation Manual

Learners may have additional or alternative documentation forms that fulfil the same function as some of the above. The contribution of each learner to the project team must be clearly identified.

RESOURCES

Modified versions of the Tasmanian Government Project Management templates are available, with originals at
http://www.egovernment.tas.gov.au/project_management/supporting_resources/templates