Personalising the Flipped Classroom - A System to Progressively Monitor Student Learning Efficacy in Real Time

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School of Business Information Technology and Logistics (SBITL), College of Business

20 February 2017

Strategic objectives addressed:

**Goal 1: Priority 1** Transform the student experience

Situated within the “Personalising the Flipped Classroom” pattern, this project allows students to access an integrated learning assessment model, supporting interactivity in e-assessment. Open Educational Resources (OERs) objects containing video/animation, augmented with technology-supported immediate learning feedback, are available to students on mobile devices. The design of each skill and concept delivery object incorporates student and academic evaluation of learning performance. A prototype of a database to store credentialed OER objects and associated learning diagnostic (quiz style) resources has also been developed as a platform for the future generation of real-time student learning analytics.

**Goal 1: Priority 4** Create a distinctive RMIT student experience through the student life-cycle by innovative use of new learning spaces and the continued development of the student cohorts.

This project delivers a system to monitor and evaluate student learning efficacy in real time. In so doing, it provides a distinctive RMIT student experience. Students are able to build a personal learning narrative, facilitated by an ability to access an integrated learning assessment model, supporting interactivity in e-assessment during learning.

**Goal 1: Priority 5** Ensure the development and transformation of the academic workforce, to deliver the academic educational goals in addition to the research goals identified in the Research and Innovation Plan.

Extensive dissemination of the project deliverables using the web, learning and teaching intranets and university expos facilitate development in accord with academic educational goals. Specifically, the Open Educational Resources (OERs) objects designed and implemented, available to students on mobile devices, serve academics as exemplars of an approach to supporting students building a personal learning narrative.

In addition, training resources to enable Do-It-Yourself (DIY) development by academic staff of video/animation objects have been developed, and delivered in Vietnam and Melbourne. Academic guidelines for designing and developing objects have been added to COBWEB.
1. Internal order number: IO Code 360536

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Phone: 03 9925 5804

Project team members:
- Associate Professor Mathews Nhkomaa
- Ms Lisa Curran (ADG)
- Dr Ross Smith

As several project team members took up positions elsewhere the following staff were employed/committed to the project, and made substantial contributions:
- Illiya Ananiev
- Bill Au
- Ashish Das (RMIT Vietnam)
- Elsie Hooi
- Quynh Nguyen (RMIT Vietnam)
- Ann Petts
- Philip Quealy
- Geoff Rigby
- Ian Searle
- Ian Storey
- Judy Tolson

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1 Executive summary

This project has delivered a system to progressively monitor student learning efficacy in real time. It operationalises the “Personalising the Flipped Classroom” pattern.

Learning resources have been examined to identify Mastery-of-Skill components in workshops and Domain Concepts in lectures. Each set of assumed skill/knowledge forms an Open Educational Resource (OER) object containing video, augmented with technology-supported immediate learning polling and feedback, and advice on further avenues for investigation, available to students on mobile devices. Video and Screen capture technologies have been employed to create the objects. H5P and Google were trialled as vehicles to integrate video and MCQ’s, ready for embedding in the Learning Management System (LMS).

Formative assessment resources (MCQs) have been developed to support delivery at the key learning review points in the “Personalising the Flipped Classroom” pattern. The design of each domain concept and mastery-of-skills object incorporates student and academic evaluation of learning performance. Learning polling and feedback technologies supporting student and academic evaluation of learning in lectures and workshops have been subject to a small scale trial (RMIT Vietnam) during semester 3 2016, with more extensive trials to be conducted in semester 1 2017. Student feedback on the deliverables/changes arising from this project, including GTS and OSI results, will be collected in Semester 1 2017. Two patterns for integration of video, MCQ and contextual cases have been created and embedded in an interaction focussed interface for dissemination.

OER development has been undertaken for Business Computing 1, IT Security, Business IT and Business Report Writing for Logistics and Supply Chain Management students. In addition specifications have been developed for OER development for Warehousing and Transport Logistics students. Given that these courses run at RMIT Melbourne, and in some cases in Singapore and Vietnam, it is estimated that, when fully deployed, 2000-3000 students per semester will be accessing these resources.

Training sessions in such OER development have been conducted for staff at RMIT Melbourne and Vietnam.

To support the deployment of the OER and MCQ resources, and the generation of learning analytics that can follow, the project commenced development of a prototype for credentialed storage. The database has the potential to lay a foundation for learning analytics geared towards a better understanding of student learning and adaptable personalised navigation through the content. Strategic insights that can be drawn from this project include:

- Recognising that academic work is changing, this project has developed and documented a process to equip academics to undertake the development of Do-It-Yourself (DIY) innovative deliverables and changes to pedagogy consistent with the flipped classroom pattern. Students benefit because they can review foundational concepts before and after class and diagnose their learning (any-device, any-place, any-time, any-number-of-times and in-transit). Staff benefit because they can more easily deliver in a flipped mode, better understand the learning needs students and respond flexibly to maximise learning and engagement. Performance can potentially be gauged by cohort, topic and student.
- Prototype development has been focussed on designing OERs and MCQ storage facility that can provide academics with access to learning resources by level of difficulty and discipline topic/sub-topic. Academics can potentially have access to analytics that improve their understanding of students and their learning.

In summary, this project has taken steps towards creating a digitally enabled and sustainable student experience. Building upon this project RMIT can have a database for storage of foundational level objects and associated MCQ assessments. Blooms taxonomy will underpin the
design of the storage location and the questions asked. This database will have the potential to interface to sophisticated analytics tools that can profile student learning and inform academic delivery in real time.

Most importantly, the project has provided an exemplar of a distinctive form of connected education, built upon the intelligent and timely use of information and analytics. Each OER object contains a link to contextual video to promote transfer of learning from the classroom case context. Delivery of these OERs to mobile devices will personalise communication and connect students.

2 Outcomes
The project, as outlined in the Executive Summary (Section 1), can be appreciated as a five step process (Figure 1).

![FIGURE 1: FIVE STEP PROJECT PROCESS MODEL](image)

2.1 Step 1: Design new pedagogy and delivery
In 2014 a pattern entitled “Personalising the Flipped Classroom” was created. An innovation resulting from that project was the development/trialling of technologically supported evaluation tools for use before students engaged in pre-class study. Students were able to use the evaluation tools to gauge their present knowledge, and so filter the pre-class study resources to personalise their learning accordingly. A model for the recommended deployment of resources to support teaching in the flipped classroom mode, in the tertiary education context, was subsequently synthesised (see Figure 2). This model captures the interplay between resources supporting the:

- In-class lecture and workshop components, deployed weekly;
- Diagnostic and challenge resources, and, in the case of the workshop components, preparatory and consolidation activities, deployed weekly; and
• Sample examination, workshop review diagnostics and case review activities, designed to support student preparation for the summative assessment of learning that takes place in the lectures and workshops, accessed by students at the conclusion of a module of study.

![Model](image)

**FIGURE 2: MODEL FOR THE RECOMMENDED DEPLOYMENT OF RESOURCES TO SUPPORT TEACHING IN THE FLIPPED CLASSROOM MODE, IN THE TERTIARY EDUCATION CONTEXT.**

In accord with this pedagogy, the starting point for the present project is the specification of Open Educational Resources (OERs) objects containing video, augmented with technology-supported immediate learning polling and feedback, and advice on further avenues for investigation, available to students on mobile devices. These resources can be deployed to students at the points identified in GREEN in Figure 2. A proforma for specifying the OERs has been developed and employed in the course of the present project (*see Appendix A*).

### 2.2 Step 2: DIY Video and Animation

The development of Open Educational Resources (OERs) using video/animation, screen capture and diagnostics for students to assess their learning of foundational materials has been undertaken. Two formats for deploying these have been explored (H5P and Google Forms). It is anticipated that for 2017 the Google Forms site layout (as shown in Figure 3) will be adopted. The Business Computing 1 resources shown in Figure 3 can be accessed and explored at:

[https://sites.google.com/a/rmit.edu.au/isys2056/](https://sites.google.com/a/rmit.edu.au/isys2056/)
A listing of the OERs developed in the course of this project is included in Appendix B, for Business Computing 1 (Table B.1), and for IT Security, Business Report Writing for Logistics and SCM and Business IT (Table B.2).

### 2.3 Step 3: DIY Screencasts

The development of Open Educational Resources (OERs) using screencast technology for students to diagnose their learning of the mastery-of-skill workshop components of their studies has been undertaken. A sample of the screencast format employed is shown in Figure 4. The sample shown is a review of the Excel IF function accessible at: [https://youtu.be/K_roY5Qm7A](https://youtu.be/K_roY5Qm7A)
2.4 Step 4: Foundational Self-Diagnostic Quiz style questions

Bloom’s descriptors have been used to classify the MCQs that have been developed as part of the OER objects (containing video, augmented with technology-supported immediate learning polling and feedback). Figure 5 illustrates the descriptors underpinning assessment examples of different depth.

FIGURE 5: BLOOM’S DESCRIPTORS FOR KNOWLEDGE AND COGNITIVE PROCESS DIMENSIONS

This classification will inform the design of the database containing video and screen capture objects and associated MCQs (see Step 5).
2.5 Step 5: Credentialed Storage and Learning Analytics

To support the deployment of the OER resources, and the generation of learning analytics that can follow from that deployment, prototype development of a credentialed storage and learning analytics database to support storage of the OER resources, including MCQ diagnostics has commenced. In doing this, we are creating a consolidated storage facility capable of enabling credentialing of student learning that will ease the burden of foundational and mastery-of-skill material in a blended environment. The design of the database structure and the interface of the prototype is available in Appendix C.

3 Project outcomes and impacts

The following project outcomes and impacts have been delivered:

- Formative assessment resources (MCQs) have been developed to support delivery at the key learning review points in the “Personalising the Flipped Classroom” pattern (GLbD strategic project 2013). The design of each domain concept and mastery-of-skills object incorporates student and academic evaluation of learning performance.

- Learning polling and feedback technologies supporting student and academic evaluation of learning in lectures and workshops have been subject to a small scale trial (RMIT Vietnam) during semester 3 2016, with more extensive trials to be conducted in semester 1 2017. Student feedback on the deliverables/changes arising from this project, including GTS and OSI results, will be collected in Semester 1 2017.

- OER development has been undertaken for Business Computing 1, IT Security, Business IT and Business Report Writing for Logistics and Supply Chain Management students. In addition specifications have been developed for OER development for Transport Logistics students. Given that these courses run at RMIT Melbourne, and in some cases in Singapore and Vietnam, it is estimated that, when fully deployed, 2000-3000 students per semester will be accessing these resources.

- Training sessions in OER development have been conducted for staff at RMIT Melbourne and Vietnam.

- The project designed and developed a prototype for credentialed storage OER resources, including MCQ diagnostics, suitable to underpin an application layer capable of real-time analytics profiling students.

Strategic insights that can be drawn from this project include:

- Recognising that academic work is changing, this project has developed and documented a process for equipping academics to undertake the development of DIY innovative deliverables and changes to pedagogy consistent with the flipped classroom pattern. Students benefit because they can review foundational concepts before and after class and diagnose their learning (any-device, any-place, any-time, any-number-of-times and in-transit). Staff benefit because they can more easily deliver in a Flipped mode and engage students. Performance can potentially be gauged by cohort, topic and student.

- Academic work needs to flexibly respond to the needs of students. Time spent last century developing foundational level skill based exercises for the classroom now be replaced by DIY media production and publication. The foundational instructions generated can now be googled and used by students on any-device, any-time, any-place and any-number-of-times. The prototype development for object and student performance storage can potentially inform an automatically adaptive learning system for students that caters for diverse navigation pathways through learning resources.

The educational value of didactic lectures with large numbers of students has been regularly debated, as there is little opportunity to effectively engage students. In future deliveries, it is envisaged that the technologies developed in this project could support reduction in the number of
lectures. Lecture and workshop resources could be chunked, and OER chunks including videos and learning evaluation resources, could be accessed by students using any mobile device.

4 Dissemination strategies and outputs
The project team has, and will continue to disseminate the findings of the research and development via the following means:

- Presentation at the RMIT University Learning and Teaching Expo (delivered during semester 2 2016 by J Richardson, with poster presentations by B. Au and R. Smith);
- The development and delivery of training to College of Business staff (Melbourne) and to RMIT Vietnam staff, as follows:
  - RMIT Melbourne: Introduction to DIY Video Production (15 June 2016)
  - RMIT Vietnam: Laboratory-based Training Sessions (24-28 Oct 2016):
    - Training Session 1: Introduction (Create object Specifications - Identify and describe foundational level lecture, workshop/tutorial content suitable for delivery using videos and assessment using MCQ diagnostics using Blooms (RVnDF 2015))
    - Training Session 2: Audio Recording and Videoing (Video camera and iPad)
    - Training Session 3: Introduction to Video Editing (Camtasia)
    - Training Session 4: Incorporating Graphics and Animations (Powtoons)
    - Training Session 5: Packaging using H5P and Google Forms for delivery using the LMS (BB).
    - Training Session 6: Showcase of Productions (Presentations of completed objects)
- Training resources for staff on the preparation of DIY video materials - Prepared by L. Curran (ADG) and available at: https://mix.office.com/watch/v69860f8386o
- Presentation at a future Higher Education Research and Development Society of Australasia (HERDSA) event
- Presentations and publications at appropriate national and international conferences (2017)
- Publication in peer-reviewed academic journals (2017-2018)

5 Evaluation of project outcomes
Ongoing evaluation within the project team occurred through progress review meetings between the project leader and project manager (approximately fortnightly), and full team meetings (approximately every eight weeks). The efficacy and effectiveness of the system to progressively monitor student learning efficacy in real time, was determined by the following means:

- A initial trial of objects for student review of lecture material for Business Computing 1 (see the description above) was undertaken at the RMIT Vietnam campus in semester 3 2016. Anecdotal evidence suggests that the students appreciated the opportunity to revise concepts using videos available on any device. The associated MCQs that enabled students to self-diagnose their understanding of the material also received a positive response.
- The video objects etc. (as trialled on the RMIT Vietnam campus) for Business Computing 1 were stored by the ADG after being edited and attached to the MCQ diagnostics and the YouTube contextual material in H5P. At the end of 2016 the controller of the software in the ADG reported many 100s of hits on the resources. This is evidence that the students are using the resources created in the project extensively.
• It was initially proposed that objects would be developed for only two undergraduate courses. However, the training undertaken (see above) has shown that staff members have quickly become skilled in creating their own objects and using their obvious talents. The number of subjects and volunteers to become involved in the training and wider project has been welcome, and has been a surprise to the project team. In addition to Business Computing 1, objects have been developed by these staff to support three further course areas (IT Security, Business IT, and Business Report Writing for Logistics and Supply Chain Management Students). Further, an introductory video for the IT Security course on the RMIT Vietnam campus has been developed (https://www.powtoon.com/c/gdJIIBQtd6V1/m), and the specifications of video objects and associated diagnostics have been prepared, but not yet videoed, for Transport and Freight Logistics.

The Future?

DIY staff use of multi-media has the potential to change academic work away from the creation of activities to enable students to learn simple concepts and skills. Academics and students then have a time space to engage in creative problem identification and solution activities. Analytics will enable us to know our student’s better and therefore prepare and facilitate better student learning experiences. To facilitate evaluation of this aspect of the objects we propose using Google to deliver the Business Computer 1 objects in semester 1 2017. This will enable investigation of student learning analytics based upon student responses to the MCQ materials, and the collection of more comprehensive analytics around overall usage generally. The Student Experience professional staff member in SBITL will be asked to conduct a thorough investigation of the impact of the video and screen cast objects in the first year common core course (ISYS2056) in semester 1 2017.

The database prototype designed and built enables storage of objects and MCQ’s used to support low-order or foundational level learning. Low-order concepts and skills are identified in conjunction with academic course coordinators and educational developers. Specifications describing the generation of multi-media objects and the MCQ diagnostics are created to augment/replace lecture and tutorial activities. This completes the Global Learning by Design interface design with a focus on interaction.

| Integration (Developing and communicating resources) | High-order learning in RBT (evaluating, creating) |
| Construction (Manipulating and working out how to use resources) | Mid-order learning in RBT (applying, analysing) |
| Conceptualization (Sourcing information or resources) | Low-order learning in RBT (remembering, understanding) |
| Narrative (for understanding) | Interactive (for searching) | Communicative (for discussion) | Adaptive (for editing) | Productive (for reconceptualization) |

Figure 6: The proposed framework from a Revised Bloom’s taxonomy perspective

The objects and MCQ’s stored in the database prototype could potentially underpin a sophisticated analytics application geared towards early assessment of at-risk. Current tools in the marketplace support peer engagement and learning where the system draws learning performance data from a positional map. RMIT has the infrastructure to extend beyond tools, such as, Pearson Dynamic.
Study modules built on catalytics. A personalised system using MyRIMIT and the mobile networks could better profile our students learning and our understanding of effective activities to support learning.
Appendix A: OER Specification Proforma (Illustrative Example)

LTIF Project – 2016

Specification of OER

Course Module: The Business Context
Course Topic: Computing for Business Success

OER Number: 1.1

Topic: What is the difference between Information Technology (IT) and Information Systems (IS)?

Content:

As we explore the role that computing plays (and will play in future) in the world of business, you will quickly become aware of the specific use that is made of a number of terms. We must therefore develop a common language, so that the stories we tell will make sense!

We start with the terms: information technology (IT) and information system (IS).

Figure 1 illustrates why these terms (information technology and information system) must be carefully defined. To make sense of them we must first understand the terms business environment, business, and business process:

- The business environment is everything external to a business that can affect its functioning, including competitors, suppliers, customers, regulatory agencies, and social and economic conditions;
- The business consists of the business processes that exist and compete in the business environment to achieve agreed purposes and produce agreed products and/or services;
- A business process is a related set of steps or activities that use people, information, and other resources to create value for the internal and external customers of the business;
- An information system is a combination of information technology, organisational infrastructure and trained people organised to collect, process, store and provide as output the information needed to complete one or more business processes; and finally
- Information technology is the computer and communication hardware and software that make information systems possible.
Appendix A: OER Specification Proforma (Illustrative Example)

Figure 1: Information Technology and Information Systems

Associated Powerpoint Images:

Definitions: Information Systems and Information Technology

- Exploring the role that computing plays in the world of business, you will quickly become aware of the specific use of key terms –
  - The business environment
  - The business
  - Business processes
  - Information systems
  - Information technology
Appendix A: OER Specification Proforma (Illustrative Example)

Definitions: Information Systems and Information Technology

- The **business environment** is everything external to a business that can affect its functioning, including competitors, suppliers, customers, regulatory agencies, and social and economic conditions;
- The **business** consists of the business processes that exist and compete in the business environment to achieve agreed purposes and produce agreed products and/or services;
- A **business process** is a related set of steps or activities that use people, information, and other resources to create value for the internal and external customers of the business;
- An **information system** is a combination of information technology, organisational infrastructure and trained people organised to collect, process, store and provide as output the information needed to complete one or more business processes; and finally
- **Information technology** is the computer and communication hardware and software that make information systems possible.

Associated Questions:

1. Which of the following statements correctly explains the difference between an information system and information technology?
   a. **Information technology** is the computer and communication hardware and software that make information systems possible. An **information system** is the combination of the information technology, with organisational infrastructure and trained people, that allows organisations to collect, process, store and provide as output the information needed to complete business processes
   b. An **information system** is the computer and communication hardware and software that make information technology possible. **Information technology** is the combination of the information system, with organisational infrastructure and trained people, that allows organisations to collect, process, store and provide as output the information needed to complete business processes

   **Correct Answer:** a

   **Feedback:** Option b has the two terms the wrong way around.

Further ideas for students to investigate:

- The term “Information System” is often used together with terms such as “Database”, “Program” and “User Interface”. Research these three additional terms. Find definitions of each. Make it clear how each relates to an information system.
  Ref: “What is an Information System?” (You Tube - 2013)
  [https://www.youtube.com/watch?v=Qujsd4vkqFI](https://www.youtube.com/watch?v=Qujsd4vkqFI)
# Appendix B: OER Development – Domain Concepts and Mastery-of-Skills

## Module 1: The Business Context

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<thead>
<tr>
<th>Chapter No</th>
<th>Chapter Title</th>
<th>OER Resources</th>
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| 1          | Computing For Business Success                    | OER 1.1 What is the difference between Information Technology (IT) and Information Systems (IS)?  
OER 1.2 Digital Disruption - How can we make sense of the evolving role and impact of computing on the world of business? |
| 2          | Social Networks and Mobile Technologies           | OER 10.1 Web 1.0, Web 2.0, Web 3.0 and the Internet of Things  
OER 10.2 Social Networks, Mobile Technologies and Business |
| 3          | Managing IS/IT Security, Risk and Ethical Behaviour | OER 11.1 Threats to Personal Wellbeing and Commercial Security  
OER 11.2 IS/IT Security Principles |
| 4          | Surviving Change in the Workplace                 | OER 12.1 Change Management - Definitions, Processes and Roles  
OER 12.2 Project Management - Activities and Tasks |

## Module 2: Business Analytics

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<th>Chapter Title</th>
<th>OER Resources</th>
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| 5          | Systems Thinking and Business Analytics           | OER 2.1 The Data/Information/Knowledge Continuum and the Challenge of “Big Data”  
OER 2.2 Business Analytics – What is it? Why is it important? |
| 6          | Analytics Drives Business Intelligence            | OER 3.1 Descriptive, Predictive and Prescriptive Analytics – Definitions and Examples  
OER 3.2 Business Analytics - Designing Spreadsheet Applications |
| 7          | Big Data Visualisation Promotes Good Business Decisions | OER 4.1 Data Visualisation and Infographics – Definition and Examples  
OER 4.2 Data Visualisation - The Future |
| 8          | Business Communication                             | OER5-1 Writing Effective Business Reports: Part 1: The Purpose and Structure of the |

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Final Project Report JR RS 21 Feb.doc  
Author: Penny Mercer  
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## Appendix B: OER Development – Domain Concepts and Mastery-of-Skills

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<tr>
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<tr>
<td>Part 3: The &quot;Body&quot; of the Report - Introduction/Aim, Analysis/Discussion and Options</td>
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<tr>
<td>Part 4: The Conclusion, Recommendation(s), Annexes and Bibliography/References</td>
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### MODULE 3: Designing Business Solutions

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<td>OER 6.2 An Introduction to Usability Design Heuristics</td>
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<tr>
<td>OER 7.1 Databases and the World of Business</td>
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<td>OER 7.2 Designing a Database - Entities, Attributes and Relationships</td>
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<tr>
<td>OER 8.1 Recognising Opportunities for Business Design/Redesign</td>
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<tr>
<td>OER 8.2 Documenting the Design of a Business System - IPO Tables, E-R Diagrams and Use Cases</td>
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<tr>
<td>OER 9.1 The Technologies that support eCommerce</td>
</tr>
<tr>
<td>OER 9.2 The Emergence of eCommerce Business Models</td>
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### TABLE B.1: DOMAIN CONCEPTS - OER RESOURCES (26) CREATED TO COMPLEMENT CHAPTERS OF BUSINESS COMPUTING 1 TEXT (Presenters: B. Au, A. Das (RMIT Vn), G, Rigby, R. Smith)

Note: Fully Packaged videos can be viewed at:


**Google Forms Format:** [https://sites.google.com/a/rmit.edu.au/isys2056/](https://sites.google.com/a/rmit.edu.au/isys2056/)
## Appendix B: OER Development – Domain Concepts and Mastery-of-Skills

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<td>Risk Appetite</td>
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<tr>
<td>2</td>
<td>Basic Security Principles</td>
</tr>
<tr>
<td>3</td>
<td>Introduction to Public Key Cryptography</td>
</tr>
<tr>
<td>BUSINESS REPORT WRITING FOR LOGISTICS/SCM</td>
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<tr>
<td>1</td>
<td>Writing Effective Business Reports:</td>
</tr>
<tr>
<td>2</td>
<td>Part 1: The Purpose and Structure of the Business Report</td>
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<tr>
<td>3</td>
<td>Part 2: The Executive Summary, Table of Contents and List of Assumptions</td>
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<td>4</td>
<td>Part 3: The &quot;Body&quot; of the Report - Introduction/Aim, Analysis/Discussion and Options</td>
</tr>
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<td>5</td>
<td>Part 4: The Conclusion, Recommendation(s), Annexes and Bibliography/References</td>
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<tr>
<td>BUSINESS IT</td>
<td></td>
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<tr>
<td>A large selection of BUSINESS IT video resources used to support “Flipped classroom delivery” to be accessed by students each week prior to class</td>
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### TABLE B.2: DOMAIN CONCEPTS - OER RESOURCES CREATED TO SUPPORT IT SECURITY (3) (Presenters: I. Storey, H. Pham (RMIT Vn)), BUSINESS REPORT WRITING FOR LOGISTICS/SCM (4) (Presenter: G, Rigby) and BUSINESS IT (Presenter: I Searle)

In addition, specification of video objects and associated diagnostics have been prepared but not yet videoed for: Transport and Freight Logistics (E. Hooi)

### Relevant Workshop Topic - Workshop Title plus PLA/WLA/CLA classification

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<tr>
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<tbody>
<tr>
<td>Data Validation</td>
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<td>Drawing Rich Pictures</td>
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<td>Database Select Query</td>
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<td>Database Dynamic Query</td>
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### TABLE B.3: MASTERY-OF-SKILL - WORKSHOP RESOURCES (11) CREATED TO COMPLEMENT BUSINESS COMPUTING 1 WORKSHOPS – SCREEN CAPTURE TECHNOLOGY (Presenters: A. Petts and J. Tolson)
System Model

The following is a description of the main database tables that allow operations of the user front end. The remaining tables are either helper or assisting objects which will not be described here.

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
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<tbody>
<tr>
<td>course</td>
<td>The system allows separation of course contents so that mcqs and associated objects can be allocated and in future restricted and/or shared by particular courses.</td>
</tr>
<tr>
<td>module</td>
<td>Each course has a set of modules to be delivered.</td>
</tr>
<tr>
<td>topic</td>
<td>Each module consists of a set of topics to be delivered.</td>
</tr>
<tr>
<td>mcq</td>
<td>Options (currently 10) that are associated with each Multiple choice question which can be used in quizzes and polls.</td>
</tr>
<tr>
<td>video</td>
<td>Attached video(s) of current topic.</td>
</tr>
<tr>
<td>slideshow</td>
<td>Attached powerpoint(s) of current topic.</td>
</tr>
<tr>
<td>quiz</td>
<td>Assigned quiz(s) to be credentialed (* not implemented as yet).</td>
</tr>
<tr>
<td>question</td>
<td>Contains the questions that have been entered which can be either a MCQ or short answer (* not implemented as yet).</td>
</tr>
<tr>
<td>cognitive</td>
<td>Remember, understand, apply, analyse, evaluate, create.</td>
</tr>
<tr>
<td>knowledge</td>
<td>Factual, conceptual, procedural, metacognitive.</td>
</tr>
<tr>
<td>upload</td>
<td>Collection of folder and object details (such as size) for any attachments that are made to the first eight tables listed above.</td>
</tr>
</tbody>
</table>

Future enhancement requires that the table structure be adjusted to better reflect changes made to the content/structure of the current electronic text used in ISYS2056 business computing course. Initial discussions have highlighted the need to include further breakdown of the topic relationship to allow for subtopics along with the inclusion of Workshop Learning activities, Preparation Learning Activities.
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Figure 2 System Database Model

(website code currently active on tables with green tick)
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Website
The following section describes the operational pages of the system for content management.

1. Site Page
Site entry is through the sign-in button located on the home page. The sign-in is currently through a simple user authentication which must be either incorporated into RMIT’s network system or synchronised with a local user management system.

![Figure 3 Home page](image)

![Figure 4 Project description (about page)](image)
2. **Sign-in**

Users are presented with a sign-in page that verifies through a simple authentication which should be further enhanced. The system currently verifies the user (email) and password. Future enhancements must be included to verify users of by identifying academics, students to segment users for maintenance and credentialing and polling / quizzing. Current view into the system is only from an academics point of view, the system will need to include a student view for credentialing.

![Figure 5 Sign-in prompt](image)

![Figure 6 Sign-in failure](image)

3. **System Icons**

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Column that highlights is attachment exists for this object</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Add a new occurrence of this object</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Go back to previous page</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>This object has an attachment</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Edit this object</td>
</tr>
</tbody>
</table>
Appendix C: Prototype Database - Credentialed objects and associated learning diagnostics: a platform for real-time analytics

Delete this object

Navigate through pages of objects, currently limited to 8 per page (* should be configurable).

4. Contents Menu
To access the main operational data contents the user can choose the menu directly from the dropdown as shown below.

![Figure 7 Content access menu](image)

5. Settings Menu
System settings and user maintenance is accessed through the settings menu.

![Figure 8 Settings menu](image)

a. Password
Current users are provided with ability to change their own passwords.
Future enhancements must provide restriction and sharing management to allow for content sharing between courses and users.
Content Maintenance
Following describes the main operational objects in the database and how they are accessed.

b. Course
On entry to the course menu link all of the course in the system will be displayed. The display allows the user to add new courses (plus icon), return to previous page (back arrow icon), edit (pencil icon) or delete (bin icon).

Any attachments (assigned using the choose files button when adding or editing) in courses will be displayed in the column with the document icon.

i. Recommendations
- Sorting options for course on code or name
- List for specific users so restriction levels on users must be implemented
- Search for specific course on code or name
- Allow duplication and sharing of course content

Figure 10 List of courses
c. Module

Each course has multiple modules assigned to be delivered throughout the semester. Modules can have attachments. Any attachments (assigned using the choose files button when adding or editing) in modules will be displayed in the column with the document icon similar to the courses view.
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i. Recommendations
- Sorting options for modules on course code or name
- List for specific users so restriction levels on users must be implemented
- Search for specific module on course code or name
- Allow duplication and sharing of module content

![Figure 13 Listing modules](image1)

![Figure 14 Adding a module](image2)

![Figure 15 Editing a module](image3)
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d. Topic
Topics are covered throughout the semester which will be credentialed in the future. Each topic is associated with a specific module and a topic will contain a set of objects which can be a combination of one or many multiple choice questions, workshop learning activity, preparation learning activity, videos (lecture or instructional), audio file or any type of document that becomes an attachment to the topic. Any attachments (assigned using the choose files button when adding or editing) in topics will be displayed in the column with the document icon similar to the topics view.

i. Recommendations
- Sorting options for topic on module
- List for specific users so restriction levels on users must be implemented
- Search for specific topic on module name
- Allow duplication and sharing of topic content

![Figure 16 Listing of topics](image1)

![Figure 17 Adding a topic](image2)
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Figure 18 Editing a topic

**e. MCQ**
Contains all of the multiple choice questions saved within the system. Each question contains 10 options as possible answers which can be left blank. MCQs have only **ONE** answer which is assigned using the option letter such as A, B … J. The question has a display for right and wrong choice.

Each MCQ has blue buttons when creating or editing that prompt the user to use specified Bloom’s prompts. These give the user an idea of what is required as a ‘kicker’ to the question.

Person that created the question is saved.

**i. Recommendations**

- Sorting options for MCQ on number
- List for specific users so restriction levels on users must be implemented
- Search for specific MCQ on question content or number
- Allow duplication and sharing of MCQ content
- List only MCQs for specific topic, module or course
- Current single prompt question should be duplicated so that randomisation of choices would make for increased number of virtual questions
- Randomiser should pick 4-5 choices from the current 10 saved and randomise the order of display, but always display the correct choice in the list.
  - MCQ would have two questions for prompting choices.
  - Each MCQ has ten choices and only one answer.
  - When displaying to student the system picks one of the two prompts randomly
  - The system picks 4-5 choices randomly out of the ten stored
  - The system will always display the choice that corresponds to the answer
  - The system will randomise the display order of the choices on every run
  - This will effectively create a virtual pool of questions easily 5 times or more of the current pool of questions
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Figure 19 Listing MCQs
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Figure 20 Adding a MCQ
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Figure 21 Editing a MCQ
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System Preferences
Access to the preferences page is through the settings menu. This page contains quick access to the contents pages for courses, modules, topics and mcqs which provides and alternate entry to content management of operational objects. Additional access to system objects and data are on this page.

![Figure 22 Accessing system objects](image)

Learning Objects
Following the theories of Bloom and Laurillard presented as part of the proposal for this project, the system will only consider MCQs at first level but can be enhanced for short answer in the next phase.

i. Recommendations
- the concept of the types of questions that were to be stored in this system varied from pure multiple choice to short answer to metacognitive project level questions where the system would be required to track all activities undertaken by a student, stored, collated and analysed to a matrix of acceptance producing a stream of feedback and grading.

![Figure 23 Question Type](image)
Importing & Exporting Data

Currently the only way to import data is by use of either the MySQL workbench database modelling application or directly importing from excel spreadsheets directly to the database using database management tools.

To export database contents buttons are provided on the system preferences page that will export data for the object that has been chosen (name of object is on the button). The data is downloaded directly to the remote system as a comma separated excel file. The object’s properties are reflected as the columns in the spreadsheet.

i. Recommendations
- to include importing od data with data validation and comparison to reduce duplications
- include exporting to Word templates formatted to provide as question papers to students

System Wide

All items added as content are tagged by the ID of the user creating them. For example the user ID of a person signed into the system creating a MCQ will be saved as an identifier on the newly created MCQ.
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Required Enhancements

- User management
- Searching & Sorting
- Restricting & Sharing
- Short answer questions
- Quizzes
- Polling
- Credentials
- Location Tracking
- Site Statistics