Increase of virtual RMIT presence for offshore courses

RMIT University
Learning and Teaching Investment Fund (LTIF) 2010
Final LTIF Project Report

Increase of virtual RMIT presence for offshore courses

• The strategic objective, or ‘theme’ addressed: *Innovation in the implementation of off shore teaching policy*

• The names of project team members Anna Bourmistrova

• The name of the School/s or Service Unit/s and College/s or Portfolio/s involved: SAMME

• The author/s of the report: Anna Bourmistrova

• The year in which the report was finalised: 2011
Increase of virtual RMIT presence for offshore courses

Contents page

An executive summary 3
A list of outcomes 3
1. Detailed Project Description and Rationale 4
2. Project Outcomes and Impacts 5
2.1 Outcomes 5
2.2 Impacts 6
3. Approach and Methodology 6
3.1 Methodology 6
3.2 Existing Knowledge and Strategic Priorities 7
3.3 Critical Factors 7
3.4 Adoption of Practice to Other Courses 7
4. Dissemination Strategies and Outputs 7
5. Evaluation of Project Outcomes 8
References 8
Appendix A  Examples of presentations 9
Increase of virtual RMIT presence for offshore courses

An executive summary

The overall aim of this project was to establish the practice of integrated teaching and learning environment for offshore teaching of engineering. The proposal aimed at a double benefit - integration of virtual and face-to-face environments and integration of onshore and offshore programs in terms of learning and teaching. The project piloted the approach in the second year Mechanics of Machines 1 course (MIET2346 – off-shore) and additionally in the first year Engineering Mechanics course (MIET2097 – on-shore) and the second year Dynamics course (MIET2124 – on-shore).

A key aim of this project was to develop and enrich the teaching and learning environment for offshore courses utilising the virtual presence of RMIT staff, to improve the learning experiences of offshore students, thus enhancing the equivalence between onshore and offshore delivery as prescribed in the Offshore Teaching Models Policy.

A list of outcomes

The objectives achieved are:

(1) development of a set of audio and visual materials from lectures, tutorials and laboratory experiments of the equivalent onshore course;

(2) integration of the captured media with other relevant components of teaching materials (like PowerPoint slides, solved examples or elements of educational videos) to design integrated teaching online blocks on topic per topic basis across the course;

(3) development of quality assurance mechanism in form of peer review;

(4) preparation for evaluation the improvement of CES(GTS) as the result of new teaching strategy;

(5) adoption of this practice to other engineering courses.
Increase of virtual RMIT presence for offshore courses

1. Detailed Project Description and Rationale

The overall scope of the project was very practical. It aimed at the development of multimedia resources from lectures, tutorials and laboratory demonstrations. This was done within the context of the current onshore course. The development of materials was designed with few objectives in mind. Consideration was given to the importance of integration between onshore and offshore courses. At the same time it was essential to consider the specifics of cultural background in case of offshore delivery.

In the process the approach was adjusted a little bit, however the overall principle remained as planned.

The project rationale:

- **Improved student learning experiences, outcomes and employment opportunities**

The project

- extended the Minimum Online Presence by providing enhancements to access, and support for educational activities that further improve the variety of student learning experiences
- provided 24/7 access to recordings which will mean greater access to lecture materials for revision and concept review
- improved the student experience through changes to teaching style, flexibility and access to a wide variety of engaging learning experiences

- **Innovation**

This project constituted an innovated approach in this particular discipline context. This approach has not been implemented either in the existing Mechanical and Automotive offshore Singapore Program or in the commencing Aerospace offshore Singapore Program. To date, these programs have relied on conventional teaching approaches: lectures, tutorials, workshops, laboratory demonstration and TLGs. This project took on-line presence one step further.

- **Strategic alignment**

**Strategically** this project supported RMIT’s commitment to build a global university grounded in Melbourne and connected to enterprises and industry across the world, thus addressing the global passport theme. It represented a step towards a program that is international in character. This was achieved in part by adding to the curriculum local and global examples which provided extra context for learning.

From the off-shore teaching policy perspective this project provided a quality assurance mechanism which helped to ensure consistency and equivalence in the onshore and offshore programs, as stipulated.

- **University wide application**

In this project the objective was to develop a mechanism which integrated virtual classes with the existing teaching techniques, thus enhancing students’ learning. Whilst this approach was initially planned for the second year Mechanics of Machines 1 course (MIET2346 – off-shore), additionally it was extended to the first year Engineering Mechanics course (MIET2097 – on-shore) and the second year Dynamics course (MIET2124 – on-shore). Thus
Increase of virtual RMIT presence for offshore courses

Onshore students already benefited from the project, as developed materials are available for them in equivalent courses. Further more it will be adopted for MIET2351 (Dynamics and Control) and MIET2368 (Dynamics). And potentially it can be adopted further in university courses, where relevant.

- Value for money

This initiative is a valuable contribution to the experience of existing offshore and onshore students, which will positively reflect on future intakes in terms of numbers and quality of candidates. This is important for existing Mechanical and Automotive Program, and it is very important for commencing Aerospace Program.

2. Project Outcomes and Impacts

2.1 Outcomes

The objectives achieved are:

(1) development of a set of audio and visual materials from lectures, tutorials and laboratory experiments of the equivalent onshore course;

More then hundred files were developed over 8 topics. This allowed to set up the overall set of tutorials for MIET2097 Engineering on MY RMIT. After conversion of Power Point files into Lectopia recordings it will be feasible to set it up for all relevant courses (onshore and offshore).

(2) integration of the captured media with other relevant components of teaching materials (like PowerPoint slides, solved examples or elements of educational videos) to design integrated teaching online blocks on topic per topic basis across the course;

We made a video recording of Conservation of Linear Momentum Laboratory and it was incorporated into presentation. Also some elements of simulation are present in a number of demonstrations.

(3) development of quality assurance mechanism in form of peer review;

Approach was discussed with tutoring staff and many of them took part in the project. It was demonstrated to students in class, during tutorials onshore and also offshore, with positive effect.

(4) preparation for evaluation the improvement of CES(GTS) as the result of new teaching strategy;

The impact of the project will be evaluated formatively in due course – as additional question in CES in semester 1 2011.

(5) adoption of this practice to other engineering courses.

Whilst this approach was initially planned for the second year Mechanics of Machines 1 course (MIET2346 – off-shore), additionally it was extended to the first year Engineering Mechanics course (MIET2097 – on-shore) and the second year Dynamics course (MIET2124 – on-shore). Thus onshore students already benefited from the project, as developed materials are available for them in equivalent courses. Further more it will be adopted for MIET2351 (Dynamics and Control) and MIET2368 (Dynamics). And potentially it can be adopted further in university courses, where relevant.
2.2 Impacts

In summary the key impacts of this project include:

**Provide a ‘global passport’ to work and learning**

- **build sustainable support mechanisms to promote student virtual mobility**
  The project developed the set of teaching materials to promote students virtual link with onshore delivery mode.

- **curriculum development based on global examples**
  Integration of offshore and onshore teaching methods enhanced the internationalization of the program.

- **enhance of equivalence of RMIT qualifications across all campuses on and offshore**
  The initiative strengthened the equivalence by the exposure of offshore students to onshore delivery mode.

- **enhancement of offshore quality assurance process**
  As the outcome of the project there is a higher level of equivalence, which is an important aspect of quality assurance. Offshore teaching staff has clearer understanding of the level of expectation in respect to their performance, which aims to improve the quality. Students also will have a better idea of onshore experience thus expect the similar level of learning experience, which inevitably improve the quality.

**Provide a positive student experience**

- Enhanced student’s learning
- **Increased Student Engagement** – improvement and extend the experience of students in informal learning and teaching online environments at RMIT
- teaching model with the use of educational technologies
- application of technology to create interesting and varied learning experiences for students

Offshore students will have an opportunity to experience RMIT teaching and learning culture and get access to additional multimedia resources. This will not only add variety and flexibility, but also will stimulate active learning skills.

Also it is expected that this study will highlight student’s understanding of the teaching methods and will open areas of further exploration and evaluation of teaching strategies.

3. Approach and Methodology

3.1 Methodology

Technically this project aimed to develop a set of audio and visual materials from lectures, tutorials and laboratory experiments of the equivalent onshore course; integrate the captured media with other relevant components of teaching materials (like PowerPoint slides, solved examples or elements of educational videos) to design integrated teaching online blocks on topic per topic basis across the course.

Initially it was planned that it could be built on existing infrastructure, such as **Lectopia**, which seemed to offer an easy-to-use, cost-effective solution. However after a number of
Increase of virtual RMIT presence for offshore courses time-consuming attempted it became clear that Lectopia is not suitable for this particular type of use. So all recordings were done simply in Power Point with a resultant set of nearly one hundred files across 8 topics. Developed resources are set up at “My RMIT”.

Recently I had the Desktop version of Lectopia installed on my computer. So as a future work I plan to convert captured media into Lectopia recordings which seems to be technically feasible with the Desktop version.

Also initially it was planned to organised material as integrated blocks, which incorporate various types of captured media. However it proved to be inconvenient because of few reasons. Lengthy recordings always have little mishaps which affect the quality of presentation. Students find it difficult to navigate their way in a lengthy presentation. File sizes are really huge. And of course it is necessary to acknowledge that attention span is limited (Wilson, 2007). So all material is organised as focused blocks of a reasonable length.

3.2 Existing Knowledge and Strategic Priorities

This project was based on existing knowledge which was advanced and converted into different form. Strategically is targeted advancement of e-learning, development of active learning skills, globalisation and improvement of students experience. From RMIT strategic priorities perspective this project aimed at: Providing a ‘global passport’ to work and learning, Providing a positive student experience (see Section 2.2).

3.3 Critical Factors

It was critical to have an adequate IT support. Unfortunately IT support was not up to initial expectations and caused a loss of time and energy. Otherwise this project was independent from the external factors and went just as planned.

3.4 Adoption of Practice to Other Courses

This approach is definitely extendable to a huge variety of programs. Of course probably every lecturer thinks about capturing this or that lecture or tutorial or laboratory demonstration and make it available to students. However it is very time consuming and it is difficult to implement it to large extend.

4. Dissemination Strategies and Outputs

In line with strategic approach advocated by ALTC dissemination framework was in the following areas:

**Engaged:**

- Identified potential engineering courses for further promotion of the approach (see Section 2.1)
- Developed strategies to engage with the academics and students throughout the project development, focusing on the intended adoption,
- Identified the range of project outcomes and potential users of the different outcomes that could be adopted and implemented by different programs
- Developed strategies for enabling each identified group of intended users to become aware of the relevant outcomes and ideas and how they might be involved in making effective use of them.
- Outlined evaluation strategies on the impact of their project outcomes with the intended user communities during and following the project development
Increase of virtual RMIT presence for offshore courses

- Accumulation of material for research publication demonstrating and providing evidence of valuable practice
- course materials to serve as an example with guidelines for intended adoption, available at MY RMIT (see Appendix A)
- examples for wider practice in other engineering disciplines, also available at MY RMIT

5. Evaluation of Project Outcomes

- Through peer feedback
  As a formative assurance there were peer consultations during the development and also peer inspection of the developed recourses at all stages of the project.

- Through students feedback
  Formatively it is proposed to include additional questions on on-line recourses into the Course Experience Survey in semester 1 2011. Informatively students will definitely give worthwhile feedback about teaching materials. It is available on MY RMIT from semester 2 2010. Presentations were used in class at workshops during Singapore visits in August 2010 and December 2010 with very positive feedback from students.

References

Appendix A  Examples of presentations

Problem 12-207
If block A is moving downward at 2 m/s while block C is moving down at 6 m/s, determine the speed of block B.

Solution
- We first mark the datum (D) line and mark the position coordinates of A, B, and C respectively as shown in the figure.
- Let us take the total length of the cord as 'L' m which is given by the position coordinates as
  \[ S_A + 2S_B + S_C = L \] (1)

(We neglect the little parts of the cord which remain constant during motion.)

We know that
\[ S_A + 2S_B + S_C = L \] (from (1))

On differentiating the above equation with respect to time, we get
\[ \frac{dS_A}{dt} + 2 \frac{dS_B}{dt} + \frac{dS_C}{dt} = 0 \] (length of the cord is constant)

Therefore,
\[ v_A + 2v_B + v_C = 0 \]

On substitution, we obtain
\[ 2 + 2v_B + 6 = 0 \] (we assume downward motion as positive)

On solving, we get
\[ v_B = -4 \text{ m/s} \]

**Ans.**

The negative sign indicates that the motion is in upward direction i.e. the block B moves upward with a velocity of 4 m/s.
Increase of virtual RMIT presence for offshore courses

**Question 12.95**

If the motorcycle leaves the ramp traveling at 30 m/s, determine the height h ramp B must have so that the motorcycle lands safely.

**Solution**

**Coordinate System:** The x-y coordinate system will be set so that its origin coincides with point A.

*Note:* The acceleration of the ball in the x-direction is ZERO and the acceleration in the y-direction is -9.8 m/s²

For Motion in x Direction:

\[ (x, v_x, v_x) = 2200 \text{ cm/s} = 21.50 \text{ m/s} \]

\[ x_v = v_x + (v_x) t \]

We know that: When Acceleration is Zero, Distance = velocity \times time

Therefore:

\[ x_f = x_i + v_x t \]

Substituting relevant quantities above:

\[ 105 = 0 + 21.50 \times t \]

Hence,

\[ t = 4.91 \text{ s} \]
Increase of virtual RMIT presence for offshore courses

**Question 12.94**

It is observed that the time for the ball to strike the ground at B is 2.5 s. Determine the speed \(V_A\) and angle \(\theta_A\) at which the ball was thrown.

![Diagram of a ball's flight path with coordinates and distances labeled.]

**Solution**

Coordinate System: The x-y coordinate system will be set so that its origin coincides with point A.

Note: The acceleration of the ball in the x direction is ZERO and the acceleration in the y direction is \(-0.9\, \text{m/s}^2\).

For Motion in x Direction,

\[
(x, t) = v_x \cos \theta_A \times t = 4 \times 50 \text{ m} = 2.5 \text{ s}
\]

We know that: When Acceleration is Zero: Distance = velocity x time

Therefore:

\[
\begin{align*}
(x, t) &= v_x \cos \theta_A \times t \\
20 &= v_x \cos \theta_A \times 2.5
\end{align*}
\]

Substituting relevant quantities above:

\[
20 = 0 - v_x \cos \theta_A \times 2.5
\]

On rearranging:

\[
v_x \cos \theta_A = 20
\]

Note: The above equation CANNOT be solved as there are 2 unknowns. Therefore we need one more equation to solve for angle and velocity.
Increase of virtual RMIT presence for offshore courses

Problem XX

A particle moves along a parabolic path whose equation is \( y = 18 - 2x^2 \) where \( x \) and \( y \) are in meters. The horizontal motion of the particle is defined by: \( X = 0, \dot{x} = 4\text{m/s}, \ddot{x} = -3\text{m/s}^2 \)

Determine:

a) The position, magnitude and direction of both the velocity and acceleration when \( x=1\text{m} \)

b) The initial position, magnitude and direction of both the velocity and acceleration

Solution:

From the question we understand that the acceleration along \( x \) direction is 0. Therefore the particle travels with a uniform horizontal velocity. \( \dot{x} = \frac{dx}{dt} = 4\text{m/s} \quad \ddot{x} = \frac{d^2x}{dt^2} = 0 \)

Since the relationship between the displacements are given, we can differentiate them with respect to time and find the velocities and acceleration at any given point.

Let us solve the case (a):

We have the equation \( y = 18 - 2x^2 \)

When \( x=1 \), we get \( y=16 \) Therefore, position \( (1,16) \) Ans.

On differentiating the above equation with respect to time, we get:

\[
\frac{dy}{dt} = \frac{d(18 - 2x^2)}{dx} \cdot \frac{dx}{dt} = 0 - 2 \cdot 2x \cdot \frac{dx}{dt} \quad \text{(1)}
\]

Therefore, on substituting \( x=1\text{m} \) and \( \dot{x}=4\text{m/s} \), we get:

\[
\frac{dy}{dx}(x=1) = -4 \quad \frac{dx}{dt}(x=1) = 4 \text{m/s}
\]

Thus, the resultant velocity is given by:

\[
v = \sqrt{v_x^2 + v_y^2} = \sqrt{(4)^2 + (-16)^2} = 16.49\text{m/s}
\]

Thus, the direction is given by:

\[
\theta = \tan^{-1} \left( \frac{v_y}{v_x} \right) = \tan^{-1} \left( \frac{-16}{4} \right) = -75.96^\circ \quad \text{Ans.}
\]