Title: **Evaluation of the Introduction of e-learning into engineering mechanics**

Introduction:
This a front end evaluation for the introduction of e-learning into the mechanical engineering course at the Polytechnic. We aim to trial some interactive web based resources into the Engineering Mechanics paper, which is a level 5 paper, carrying 15 credits and will run in the second semester of the new academic year. The actual e-learning resource has not yet been developed but the [Merlot website](#) has an interactive resource along the lines that is intended to be introduced into the engineering mechanics paper.

In the words of Allison Rossett (Rossett, 1995) a needs assessment seeks to:

> Gather information to assist professionals in making data driven and responsive recommendations about how to solve the problem or introduce the new technology.

This needs evaluation is to provide information to help make decisions about the introduction of new e-learning resources.
This evaluation will include two questionnaires to students, one to ascertain their learning styles, and the second to find out how they feel about merlot resource. We are using the merlot website to mimic our resources, from which information about student's opinions and feelings can be gained with some relevance. The evaluation will also include interviews with teaching staff and prospective employers to determine that the resource is in line with teaching requirements and relevant to industry.

Background:

What is to be evaluated?
It is intended that web based e-learning be introduced into engineering learning resources. A pilot resource is to be introduced into Engineering mechanics in the form of a interactive resource along the lines of a resources that has been developed and available in the public domain from the Merlot website namely "[MecMovies](#)" on this address: http://web.mst.edu/~mecmovie/ . For the sake of this evaluation we will use the [MecMovies](#) resources to get some idea of how students react to the resource. The actual resource will need to be developed to meet the requirements of our Mechanical engineering course.

Why
In the Mechanical engineering course that are currently being developed at the polytechnic, e-learning take the form of electronic notes and assignments made available to students on a web based filing system. A more dynamic use of interactive e-learning in the form of quizzes, video recordings of lessons and possible group discussions is proposed.

It will take some time to introduce e-learning into the engineering course, the intention is not to replace face to face learning but supplement it with additional resources i.e. to develop resources towards an appropriate blended delivery. The introduction of e-learning is envisaged to increase as students and tutors become more aware and familiar with types and capabilities of tools available.

The Polytechnic is committed to providing a modern facility that is internationally recognized with student focused teaching methods. E-learning offers another form of teaching which may appeal to students who require a more time flexible platform and those students who are at different skill levels. With this in mind e-learning is to be introduced as an additional teaching resource. David Haffaker (Huffaker, 2003) concluded:

> Elearning application can be personalized to the learners needs and still provide communication that foster collaborative, pro-social work. Since e-learning offers an anytime-anywhere transfer of information, it cultivates learning both inside and outside the classroom.

Which is supportive of the benefits of a flexible platform, While Mason and Rennie (Mason & Rennie, 2006) pointed out that:

> …blended approaches can encourage participants to make better use of face to face contact in the knowledge that preparations and follow up can be conducted online. .

Which supports the use of blended learning.

This needs assessment is to is to try and clarify issues that may arise for both students and teachers and to ensure that the resources used are appropriate for the learner in terms of current usage and for their future prospect employment.

Purposes:
To investigate appropriate methods to introduce online interactive e-learning into a engineering mechanics course if it was offered by blended delivery?

Audiences:
 The stake holders are
Students present and future
Engineering tutors at the polytechnic
Future employers of graduates
Degree Accreditations boards

Decisions:
Estimation of how much time, effort and money should to be spent into establishing e-learning resources in the engineering course based on recommendations from the needs assessment.

Questions:
There are two guidelines taken from massy university elg web site (Massy University, 2006) "Guidelines for the support of e-learning in New Zealand tertiary institutions" as follows with sub questions for this evaluation.

TD3　　*How does the e-learning encourage a realistic progression towards self direction and recognises varied starting points in levels of confidence and motivation?*

This guideline looks at student's familiarity with technology and whether they are capable of using the e-learning without the need to up skill at the same time as they are trying to learn the course material. This is relevant to the introduction of e-learning as if the new resource is not pitched at the correct level, or with the support required the e-learning can be contrary to the learning objectives.

Sub Questions
- 隐 Will students be suitably skilled to use the technology?
- 隐 How do students feel about using web based interactive learning resources.
- 隐 Will there be sufficient technology support
- 隐 Will tutors embrace the new technology and the use of e-learning for teaching.

SD3　　*Do students gain knowledge relevant to employment and/or current thinking in their field?*

One of the mandates for the existence of the polytechnic is that their graduates have relevant skills for their chosen vocation. There has been a common complaint by employers that graduating students are not 'work ready'. That may well be an unreasonable request by employers but the Polytechnic's aim is that courses will give students skills that are aligned with industries requirements .
Sub Questions
- 隐 How important is online learning for preparing graduates for e-engineering in their careers?
- 隐 Is investment into e-learning resources of this type justified in term of relevance to the working environment?

Methods:

How the evaluation will work.
This evaluation will use a 'multiple methods' model to collect data and information. The paradigm used is the Eclectic-Mixed Methods-Pragmatic Paradigm. This methodology allows for a number of different ways to look at the same question. As Professor Tom Reeves (Reeves) suggested that this paradigm is most useful "*Because it is the one approach most capable of handling the complexity that is the hall mark of contemporary society and technology*". Instructional design is complex and does not lend itself to large volumes of data collection or being able to isolate any one variable. This

evaluation uses both surveys and interviews, with some quantitative data collection for students current learning styles and technology usage, and some open ended questions aimed to get students, tutors and industrial experts opinions and comments.

Types of data collection devices that will be used
Student learning styles survey – To find student demographics and learner types. Prospective students currently enrolled in the foundation engineering course are to be given a 'learner style' questionnaire – this will help establish how many students will benefit from the use of e-learning resources. The Learning styles questionnaire in on line http://www.engr.ncsu.edu/learningstyles/ilsweb.htm it is a 44-item questionnaire that can be submitted and automatically scored on the Web.

Student survey on a trial resource. A number of students, volunteers from the group of currently enrolled engineering students, approximately 6-8, will trial the "mecMovies resource and fill out a survey as to their opinion and feelings about the use of the on line interactive learning resource. This survey would have open ended questions encouraging students to give opinion and possible recommendations.
Student interviews on the trial after being videoed. Video record students while they do the trial software, and then interview them using the recording to prompt them. This tool will not be used in this evaluation due to time and equipment constraints.
Expert review – Conduct an Interview with engineering tutor/s. as to their view on e-learning resources. In respect of difficulties and advantages they see in the implementation of e-learning.
Conduct an interview of one relevant industry person (preferably a prospective employer) to see if the resource will compliment skills that are required in the work force, i.e. that the technology skills student acquire while using on line learning resources are relevant and of future use to students when they gain employment.

Matrix Evaluation tools Vs Questions	Student learning style survey	Student technology skill survey	Students trial resource comments	Peer interview	Industry expert interview	[1]Student interviews on the trial after being videoed
Will students be suitably skilled to use the technology?	X	X		X		X
How do students feel about using web based interactive learning resources.	X	X	X			X
Will there be sufficient technology support				X		
Will tutors embrace the new technology and the use of e-learning for teaching				X		
How important is online learning for preparing graduates for e-engineering in their careers?				X	X	
Is investment into e-learning resources of				X	X	

this type justified in term of relevance to
the working environment?

Instrumentation:
- The **trial software** to be used is that on Merlot "MecMovies"url address
  http://web.mst.edu/~mecmovie/
- **Learner style questionnaire "**Index of Learning Styles Questionnaire"
  developed by Barbara A. Soloman and Richard M. Felder of North Carolina State
  University
  Raleigh, North Carolina url address
  http://www.engr.ncsu.edu/learningstyles/ilsweb.htm
- **Student technology usage and trail software survey Attached appendix 1**
- **A questionnaire for interviews** of teachers and prospective employers
  Appendix 2

Limitations:
The small numbers of staff and students involved gives a limited view for the results.
The actual e-learning resources which we will use may vary from the one we trail.

Logistics:
Learner style survey, trial software "MecMovies" and questionnaire to be conducted
outside of class time.
Organize students trial – in their own time outside of class
Conduct a student review on the trail software (Questionnaire as per appendix 1)
Prepare an informal interview with peer tutor and prospective employer

Time Line:
Preparation of evaluation questionnaires and trail assessments – Complete by
21 may
Carry out the trail with students in week
        24 to 28 May
Interview with tutor and industry expert also in week
        4 to 28 May
Collation of results
                31may to 5June
Compilation of report
        26 June

Budget:
Staff time   48 hours
        Preparation of proposed evaluation plan

Preparation of surveys and interview
Completion of surveys and interview
Collation of results

Compilation of report
Cost Staff time 48 hours at $65/hr   cost $ 3120

Incidentals $ 350
Total Cost $ 3470

Appendix 1

E-learning Participants Questionnaire
Thank you for taking the time to fill in this questionnaire. This questionnaire is being used to investigate the online technology you use and your experiences.
Responses to this questionnaire will be absolutely confidential and no other participants will be able to see your data. The answers to this questionnaire will go only to the project researcher (Pradeep Nathoo) and any information which could potentially identify participants will not be disclosed.
Please tick the relevant boxes and be as full and comprehensive as possible with your other answers.

Section A: Information about your technology use

Q1: Approximately, for how many years have you been using a computer for?
(Please enter a numerical value only)

Q2: I normally use a computer (please tick one)

| Every day | A few times a week | Occasionally | Rarely/never |

Q3: I have access to broadband (please tick all that apply)
At home/student residence   At work   At University/College/Learning Centre

Other Location (please state)

Q4: I normally access the Internet to look for information(please tick one)

| Every day | A few times a week | Occasionally | Rarely/never |

Q5: Approximately, how many hours a week do you spend at home or somewhere else on the Internet including using the internet(for work, recreational and educational purpose)?   *(Please enter a numerical value only)*

Yes

No

Q6: When I use a computer, I customise it to suit my personal preferences e.g. background colours, icon sizes, mouse buttons, menu items, size of print on screen:

If yes, please briefly list the changes you most often make:

Yes

No

Use of online tools

Q7: I use social networks (E.g. MySpace, Flickr, Facebook)

If yes:which do you use?

Q8 How often do you use synchronous (At the same time) chat tools? (please tick one)

Every day	A few times a week	Occasionally	Rarely/never

Yes

No

Q9: I use messaging and discussion tools (E.g. Email, forums, phone texting)
If yes which do you use?

How often do you use messaging and discussion tools? (please tick one)

Every day	A few times a week	Occasionally	Rarely/never

Yes

No

Q10: I play online games or use virtual worlds and talk to other players (E.g. World of War Craft, Battlefront 2, Sims Online, Second Life)

b) Which do you use?

How often do you play online games or use virtual worlds (please tick one)

Every day	A few times a week	Occasionally	Rarely/never

Yes

No

Q11: Do you have a personal website/blog?

If yes: which do you use?

How often do you use your online personal space? (please tick one)

Every day	A few times a week	Occasionally	Rarely/never

Yes

No

Q12: I use other social networking and communication tools online (E.g. Online dating, Friends Reunited, ebay)
If yes:which do you use?

c) How often do you use your other social and communication tools online? (please tick one)

Every day	A few times a week	Occasionally	Rarely/never

Q13. **Overall, how confident are you in the use of computer-based and Internet-based communication and information methods?**

Extremely unconfident	unconfident	confident	extremely confident

Section B Survey on Trial interactive learning resource

With regards to the MecMovies interactive learning resource that you trialled in class can you answer the following questions. Please be honest and as critical as you wish, The results are fully confidential. Your comments are most valuable

1   The instructions for using the resource were easy to follow

Strongly agree	Neutral	Strongly disagree

Comment

2   To navigate around the resource was easy

Strongly agree	Neutral	Strongly disagree

Comment

3   the resource was a helpful way to learn.

Strongly agree	Neutral	Strongly disagree

Comment

4   I feel that I learnt something from the resource

Strongly agree   Neutral   Strongly
                                                                          disagree

Comment

5   I would like to use more of this type of learning resource as part of my course

Strongly agree   Neutral   Strongly
                                                                          disagree

Comment

6. What sort of support do you believe you will need if you are asked to use interactive learning resources (such as the one you trialed) regularly in your course?
Comment

7. What type of skills do you believe you need for eLearning (online- Internet, multimedia, computers)

    Comment

Section C: Personal Details
Name:
Age: (*Please enter a numerical value only*)
Gender: Male   Female

Which program do you intend to study
Engineering Electrical   Engineering mechanical

Employment/education Status:
In full time education   In part time education   Not in education

Appendix 2
Interview of tutors and industry expert

Interview questions

This interview is for the purpose of investigating the best method to introduce elearning into a mechanical engineering course that is to have a blended delivery. You opinion is confidential and valued

For the industry expert

Skill levels For the following table, place a tick in the skill level you feel that an engineer must have in today's modern engineering concern. for each of the items listed

		Very skilled	Skilled	Unskilled	Very unskilled	Do not use
Software applications	**CAD CAM**					
ICT	**Wikis blogs**					
Digital information	**Ability to use online library resources**					

Do you feel it is necessary for engineers to be able to be able to program in a software language
Do graduate mechanical engineers use web based software.
What forms of software are used in industry. (i.e CAD CAM Mat lab etc.)
Can these skills be developed while working – is this preferable?
How much web based / internet usage would an engineer expect?

Questions for tutors
Do you feel you have the skills, time to use e-learning software
What is your opinion on the introduction of elearning into engineering programs
How much e-learning should there be (%)?
What type?
How should it be used
Do you feel that students will enjoy using elearning
Will it require students to up skill?
Will it require teacher up skilling
What drawback or difficulties do you foresee
What advantages are there
Are you or other staff members able to develop and modify electronic interactive learning software for appropriate use and level in the classroom
Do you feel that there is sufficient technology support to be able to deliver e-elearning in a

blended course?

References

Huffaker, D. (2003). reconnecting the classroom:Elearning pedagogy in US public high schools. *Australian Journal of education Technology , 19* (3), 356-370.

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Rossett, A. (1995). *Needs Assessment. In G. Anglin (Ed), Instructional technology: Past present and future (2nd Ed.) (pp 183-196) Englewood CO: Libraries unlimited..* Englewood Co libraries unlimited.

Tom, R. (n.d.). Retrieved feb 5, 2006, from http:/www.educationau.edu.au/archives/Cp/refs/reeves_paradigms.htm

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[1] This tool is not to be used in this evaluation