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NDLR  
National Digital Learning Repository

## Learning Resources for the Future of Engineering Education

Dermot Brabazon & Muireann O'Keeffe  
Dublin City University

International Symposium for Engineering Education 2007

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## Introduction

- Web-resources
- Re-usable learning objects (RLOs)
- Impetus for Repositories
- National Digital Learning Repository (NDLR)
- Mechanical Engineering Community of Practice
- NDLR Learning Resources

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## Web resources available

- Unit conversion calculators
- Web dictionaries
- E-books
- PowerPoint presentations
- Images, text, audio and video files
- Computer games
- Sophisticated modelling applications
- You Tube
- Blogs

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Links - Engineering Tools

ENGINEERS IRELAND

**Calculator.org**  
Free online calculator and conversion tables.  
[www.calculator.org](http://www.calculator.org)

**Cheresources**  
Study Aids for Chemical Engineering. Some free. Fee for premium content.  
[www.cheresources.com/indexzz.shtml](http://www.cheresources.com/indexzz.shtml)

**Design Aids Freeware**  
Huge number of useful programs for all Engineering Disciplines.  
[www.designaids.com/freeware.html](http://www.designaids.com/freeware.html)

**EVL's Ejournal Search Engines - Engineering**  
Search the content of over 160 freely available full-text engineering e-journals.  
[www.eevl.ac.uk/eese/eese-eng.html](http://www.eevl.ac.uk/eese/eese-eng.html)

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The Thermal Wizard

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Multilayer Wall and Flow Conditions

| Description   | Symbol         | Value         | Units                        |
|---------------|----------------|---------------|------------------------------|
| Height        | H              | 3.0           | Meters                       |
| Depth         | D              | 3.0           | Meters                       |
| Temperature 1 | T <sub>1</sub> | 200           | °C                           |
| Heat Flow     | q              | 100           | W                            |
| Layer         | Sym            | Thickness (m) | Thermal Conductivity (W/m.K) |
| Layer 1       | 11             | 0.01          | 14.5                         |
| Layer 2       | 12             | 0.02          | 14.5                         |
| Layer 3       | 13             | 0.02          | 14.5                         |
| Layer 4       | 14             | 0.02          | 14.5                         |
| Layer 5       | 15             | 0.02          | 14.5                         |
| Layer 6       | 16             | 0.02          | 14.5                         |
| Layer 7       | 17             | 0.02          | 14.5                         |
| Layer 8       | 18             | 0.02          | 14.5                         |
| Layer 9       | 19             | 0.02          | 14.5                         |
| Layer 10      | 110            | 0.02          | 14.5                         |

Results for Isothermal Multilayer Wall

| Description  | Symbol         | Value  | Units |
|--|----------------|--------|-------|
| Temperature 1 <sup>o</sup> = T <sub>1</sub> + q * Σ (L <sub>i</sub> / k <sub>i</sub> ) = (T <sub>1</sub> + q * Σ (L <sub>i</sub> / k <sub>i</sub> )) | T <sub>1</sub> | 200.04 | °C    |

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### Other resources

- E-Mentoring via society web-site
  - Student directly in contact with practicing engineer
  - Not limited by geographic boundaries
- Distance learning courses available internationally
  - American Society of Materials
  - American Society of Mechanical Engineers
  - Society of Manufacturing Engineers

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### Remote Laboratory Virtual Instruments

- Easily be made available via the internet
- Studies show
  - better results achieved when used as a learning aid during the lab
  - remote use produce similar results compared to traditional mode
- Examples
  - Charles University, Prague
  - Dublin City University

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### Capillary Viscometer

This experiment is split up into three sections, a link to each is shown below. Read the instructions for each section before beginning them.

- Section 1. In the first section you will be given an introduction into polymers, plastic processing, semi solid metals and statistical design of experiments.
  - Plastics
  - Statistical Design of Exp
  - Semi Solid Metals
  - Injection Moulding
- Section 2. In this section you will read and carry out the procedure for the experiment. You will use the computer to record some of your data. This will be made available to you in order to complete your report.
  - Procedure and Datalogging
- Section 3. In the final section you will be told what you have to do with the data you have collected and recorded in your answer book. You will also be given a list of requirements your report should include.
  - Report Requirements

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### Impetus for Repositories

- Central online service
- Hold Reusable learning objects
- Greater range of resources to each lecturer
- Improve educational standards
- Minimise cost to organisations
- Minimise the workload to individuals

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## Repository Examples

- Canadian repositories: MERLOT, CAREO, POOL, CLOE
- UK: JORUM
- Education Network Australia (EdNA)
- MIT Open Course Ware
- National Engineering Education Delivery System
- EducaNext

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## Non subscriber catalogue based

- World Lecture Hall
- EEVL
  - including Intute contains 114,689 RLOs
- Bubl Information Service
  - catalogues engineering internet resource

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## National Digital Learning Repository (NDLR)

- HEA pilot project
- Irish Universities & Institutes of Technology
- Online resource repository
- Sharing of teaching and learning resources
- Encourage collaboration within subject communities
- Quality control by members of the Communities

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## Using NDLR resources

- Reusable Learning Objects (RLOs): resources that can be reused for teaching and learning purposes
- Learning resources from NDLR can be incorporated into
  - VLE (Moodle, WebCT, Blackboard)
  - Lecture notes
  - Student assignments
  - Student practical
  - Resources can be re-customised

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## Mechanical Engineering CoP

- Members include everyone who teaches any aspect related to mechanical engineering at higher level
- AIM: Promotion of best practice for development, delivery and sharing of mechanical engineering education
  - Development of RLO's
  - Sharing of RLOs in NDLR
  - Regular meetings
  - Workshops
  - Events for engineering educators - ISEE 2007: 17<sup>th</sup> – 19<sup>th</sup> Sept
  - ISEE 2008: 2<sup>nd</sup> week Sept – call for papers; deadline: June 2008

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## ME CoP Learning Objects

- Over 50 mechanical engineering resources
- At least 200 resources by Dec 2007
  
- Remote Laboratories- virtual instruments
- [Gear animation](#) - UL
- [Solid work tutorial](#) (Fascia) UL
- [Temperature Volume](#) diagram for water NUIG

## References

- ME CoP Coordinator: [Dermot.brabazon@dcu.ie](mailto:Dermot.brabazon@dcu.ie)
- NDLR Coordinator: [Muireann.okeeffe@dcu.ie](mailto:Muireann.okeeffe@dcu.ie)
- NDLR: <http://www.ndlr.ie>
- ME CoP: <http://www.ndlr.ie/mecheng/blog>
- Links in this presentation: <http://webpages.dcu.ie/~brabazon/IMC07.html>
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