

Teaching and learning resources developed at Lille 1 University (Sciences and Technologies) for the French digital universities

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Ion-Cosmin GRUESCU, Associate Professor

ion-cosmin.gruescu@univ-lille1.fr

Thematic field :

2. Problem- and project-based learning, including e.g. research-based learning
 3. Intercultural / interdisciplinary cooperation in teaching projects
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Short CV

2000 Mechanical Engineer – University “Politehnica” Timisoara (Roumania) – Faculty of Mechanics, Engineering and Technological Management department;

- internship : Fachhochschule Gelsenkirchen, Physikalische Technik Fachbereich

2004 PhD – University Lille 1, Mechanical Engineering

2005 Associate researcher (post-doctorate) – National Polytechnic Institute of Lorraine, Nancy (laboratory of geomechanics)

2006 Associate Professor, University Lille 1 – IUT A, Mech. Engineering Department

2009 Teaching manager of the vocational bachelor degree in “eco design of innovative products”

Objectives :

- ✓ the development of an active learning (student based) approach
 - ✓ strengthening the partnership university – professional networks
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Plan of the presentation

1. Introduction
2. The P2NT – GMP educational project and the pedagogical approach of the Mechanical Engineering department :
 - active learning
 - the use of digital resources
3. The French digital universities **UNIT** and **UVED**
4. Pedagogical and training experiments :
 - the vocational bachelor's degree in industrial production,
(speciality "eco-design of innovative products")
4. Conclusions

1. INTRODUCTION

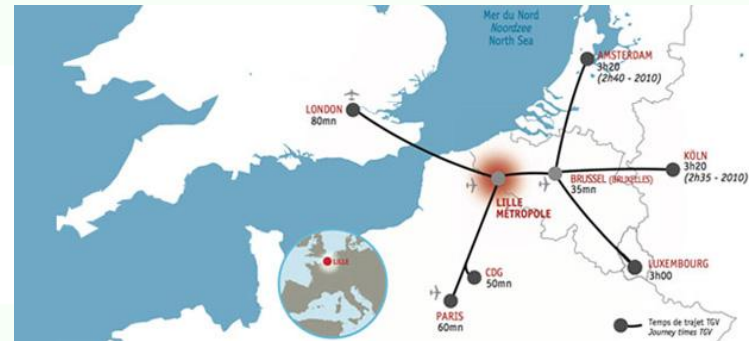


The LILLE 1 University – Sciences and Technology

- ✓ founded in 1562 by the Spanish, became French in 1667
- ✓ Louis PASTEUR was the first Dean of the Science Faculty in 1854
- ✓ State University

Key figures (2014)

- 19 604 students – 21% are international (70 different countries)
- Fields of study:
 - Science and Technology
 - Human and Social Sciences
 - Economics and Management Sciences
- 2975 staff members (academic and administrative)
- 1100 Doctorates of which 30% are international
- Research is organised around 5 Institutes and 3 Research Centres (45 laboratories)
- Lille 1 possesses 5 doctoral schools in Engineering Sciences



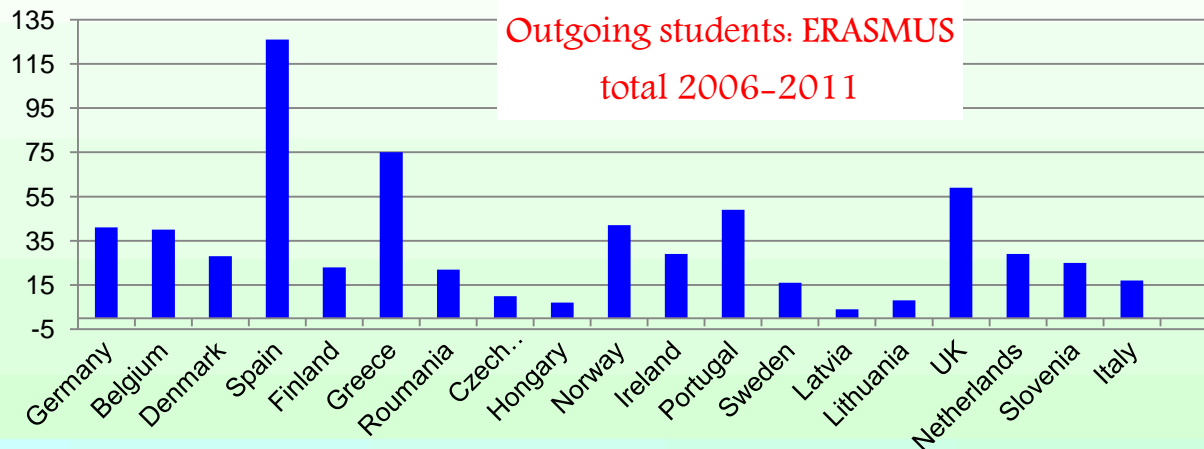
1. INTRODUCTION

The Technical Institute « A »

- ✓ founded in 1966
- ✓ 7 departments, 20 000 graduates

Key figures

- 2130 students – 21% are international (70 different countries)
- Fields of study: Business and Companies Administration, Biology, Electrical Engrg. and Ind. Informatics, Computer science, Mechanical Engineering, Metrology, Chemistry
- almost 200 outgoing students (Erasmus)
- more 70 students outside Europe : Canada, Japan, Indonesia, Russia, Africa, Mexico, etc



1. INTRODUCTION

The Mechanical Engineering Department

- ✓ Industrial and organisational partnership (Mechanical Engineering department) :
 - **KSB** (pumps and fittings)
 - **SNECMA** (total quality tools for training)
 - The Marc Sautelet Institute
(equipment for disabled)
 - **HAAS** training center
 - **Dassault** (Catia) authorised training center

- ✓ Technical center for the « Course in cours » race



1. INTRODUCTION

The Mechanical Engineering Department

- ✓ The French–German exchange
 - Fachhochschule *Wiesbaden (Germany)* – *Lille (France)*
 - 14 students (7 Fr)
 - Duration : 2 weeks

- ✓ Apprenticeship group (2nd year Bachelor)

- ✓ The Vocational Bachelor's Degrees in
 - ecodeSIGN
 - innovative textiles
 - industrial vision




vallourec

Aude Vanzebroeck, 23 ans, élève en 2ème année de DUT GMP à Lille. Elle fait cette 2ème année en alternance dans l'entreprise de Vallourec.

Dans l'entreprise Vallourec, elle doit mettre en place une procédure de qualification de l'opération d'abavurage c'est à dire retirer les bavures après l'usinage. Elle rédige des modes opératoires communs et les déploie pour harmoniser les pratiques.

Elle a été étonnée d'être considérée comme une salariée à part entière de l'entreprise, et d'avoir son bureau et son ordinateur.

Avec Vallourec, elle a découvert qu'une entreprise industrielle qui travaille à l'internationale présente des modes de production différents en fonction de chaque usine et de chaque pays.

« Alternner c'est s'élancer sur le tremplin de l'emploi, créer son réseau et rassembler des expériences riches »



2. The P2NT-GMP educational project

Background (initial findings and motivation)

- ✓ traditional lecture course (large body of content / large number of students) is a "one-way transmission of knowledge" efficient presentation which faces superficial learning
 - ⇒ does not stimulate students' motivation (poor) / attitude : limited participation, poor attendance and almost inexistent individual instructor–student interactions efficient presentation

- ✓ course evaluations
 - students were not satisfied ; the course was “boring”
 - lack of recognition for the usefulness of the course content (education, future needs)
 - more concerned with their test scores than with gaining a thorough understanding of the course material

2. The P2NT-GMP educational project

Proposed solutions

- technical platform - new innovative equipments and realisation of user guides and /or technical worksheets allowing to the learner to self-train



- the development of **new digital resources** and educational kits allowing to other trainers to adapt the proposed resources with respect to their needs and practices
- the valuation and the capitalization of the acquired experience and of the developed tools : "feedback guide", congresses, symposiums, (Gruescu, 2014 and Gruescu et al., 2014).

2. The P2NT-GMP educational project

The Digital Ressources

The targeted audience

- Undergraduate students (L1, L2, L3) or Masters students (M1, M2)
- initial, continuing and apprenticeship training course
- the trainers themselves (educational kit).

The proposed digital tools

- ✓ excellent mean for favoritizing student success allowing them to train themselves
(high and strong level of educational interactivity)
- ✓ of expository type (important use of communication tools with the learner - forum, chat, etc)
- ✓ a strong presence of exercises, multiple choice questionnaires, case studies / other activities
centered especially on the [Problem Based Apprenticeship](#) (similar to the serious game activities)

2. The P2NT-GMP educational project

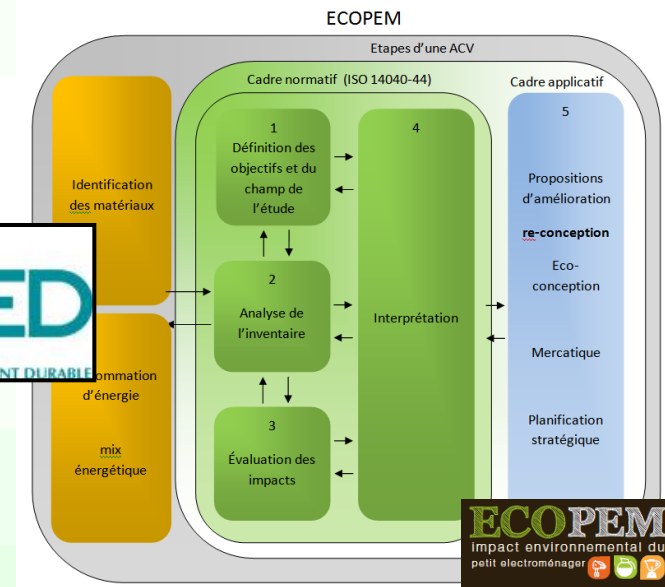
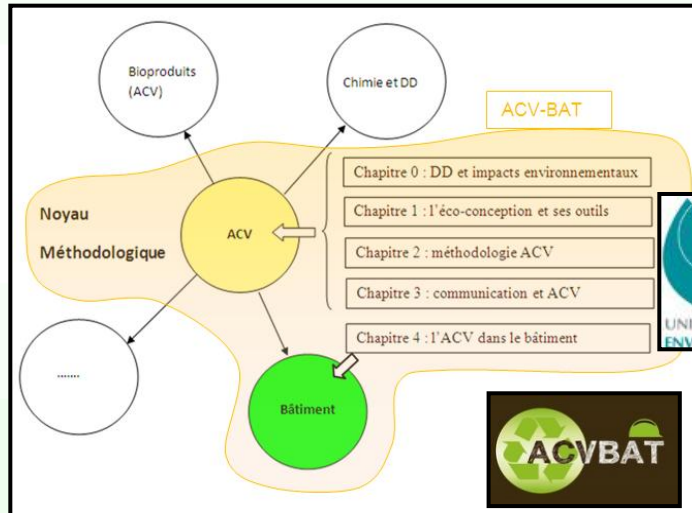
The Digital Ressources

- ✓ **The educational grains are** designed by abording several fields of engineering sciences;
- ✓ Several types :
 - sequential : the information is detailed in one grain
 - parallel, under the form of worksheets : elements giving the "theoretical" information (attached to the methodology) and the practical information (application to the case study)
 - the boxes are opened by the learner one by one
(learn, self-evaluate, acquire new knowledge and information)
 - teacher's role / contribution : essentially at the case study level / in the project approach

3. The French thematic digital universities : **UVED**

The ECO PEM and ACV Bat projects. Materials science and Life Cycle Assessment Methodology used in engineering and products design

- Scope : evolution of pedagogical contents in the the technical sector
- Public : Bachelor's and Master's degrees



Materials Science and Life Cycle Assessment

- ECO PEM : energy greedy products in household applications
- ACV Bat : materials from the building sector

ECOPEM

ACVBAT and **- the radar tool**

3. The French digital universities UNIT



The 3PM - EFAU project. Manufacturing engineering

Study design and course description

Analyse de fabrication

- Scope : evolution of pedagogical contents in the the technical sector
- Public : Bachelor's and Master's degrees
- A two-semester course that typically enrolls around 100 students a year
- ✓ 4 main parts : theoretical presentations, videos, exercises and multiple choice questionnaires
- ✓ a new lecture dedicated to the materials used for the machining tools production
- ✓ designed to serve as an intellectual bridge between materials science and machining
- ✓ work in small groups, each case study - several minutes of discussion (statement of problems)
- ✓ additional strategies to create a more *student-centered* learning environment : every lecture includes a set of learning goals made explicit to students in the lecture PowerPoint slides
- ✓ the exam are labeled with the corresponding learning goals (alignment with assessment)
- ✓ as part of the course revision, and based by the use of a Moodle platform, we modified the assessment plan to include weekly quizzes

4. Pedagogical and training experiments

- ✓ the Problem-based Learning (PBL) (e.g. Barret and Moore, 2011) is more interesting for students and auditors because it directly deals with real cases
- ✓ the student is no longer a “listener” but becomes an actor of the methodology, which permits him to acquire knowledge and abilities more quickly and more durably
- ✓ our method also deals with “organisational learning” given the proposed interactions between the working groups and given the time constraints that each team has to face

The vocational bachelor's degree in industrial production, speciality "eco-design of innovative products"

- ✓ dedicated to eco-design students, who are privileged holders of an eco-designed approach, in position to disseminate and implement in practice its innovative concepts and principles
- ✓ trained to acquire technical, scientific and organisational skills required by companies to implement the eco-design in their practices
- ✓ 11 modules, totalizing 480 hours of training, spread over two academic semesters and worth 60 ECTS (European Credits Transfer System).
- ✓ the main outcome of this project is respectively the evolutionary design

5. Conclusion

- ✓ Lille 1 – Mech. Eng. Department developed a pedagogy focused on incorporating active-learning and student-centered pedagogy in courses
 - the creation of a technological platform (innovative technical equipments)
 - the reorganisation of existing courses / introduction of new ones

- ✓ changing the instructional design of a course, without wholesale changes to course content ⇒ good feedback, more positive results in students evaluation (improved attitude and/or performance)

- ✓ the use of the PBL methodology – permits to train students, auditors, or designers :
 - ⇒ better results (appropriation of the subject) than those which could have been obtained using conventional pedagogical methods
 - ⇒ lead to creativity, innovation, or scientific results.

5. Conclusion

- ✓ active learning – key aspect of the education, can be applied to any learning environment (online to standard lectures or as a blend of these)
- ✓ the approach has been applied to mechanical manufacturing, eco–design and Life Cycle Assessment courses but it is clear that the application field is not at all limited
- ✓ the course reorganization provides not only a model for revision of an individual course but can also be a catalyst for institutional reforms.
- ✓ the force of the project lies not only in the interest of the aborded themes but equally in its regional and national recognition

Thank You !

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