Sharing, transmitting storing information and knowledge in Higher Education Establishments

PhD Seminar
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Outline

- Background
- Research Hypothesis
- Research Methodology
- Observational & Historical Studies
- Concluding remarks
Continuous organizational changes may allow organizations to maintain their relationships with a turbulent and complex environment.

Characterization of factors rendering an organization capable of getting and maintaining its effectiveness through organizational changes remains an issue with arguments.

Some scholars have paid attention to the capability of large organizations / conglomerates to learn and continue creation of new knowledge (Nonaka, Drucker, Davenport, Liebowitz etc) as condition for any organizational policy advocating continuous changes in order to face the growing complexity of the marketplace.
Knowledge may be regarded as a function of beliefs.

- Change of belief is assumed to cause creation/adoption or adaptation of new knowledge.
- Flow of knowledge may relate to articulation and disarticulation of such belief.
- Flow of knowledge amongst peers may need continuous monitoring and facilitation at different stages of the diffusion of the knowledge of domain.
- Language helps representing objects and their corresponding characteristics:
  - Abounding with specialist terms, that some may be emergent.
- Trace of knowledge is contained into Documents (2 categories).
Background

- Higher institutions: Academic Knowledge represented by Academic Credentials
- Faculty beliefs and competences are shared or transferred to students during its study
- \( \sum (\text{Acquired Credentials}) \rightarrow \text{Diplomas} \)
  - Proof of participation
  - Academic merit attestation \( \rightarrow \) Eligibility to certain job
  - Position: Confer some advantages on some individuals
  - Assist social mobility
  - Open doors (further study, Job opportunity)
  - Possession of certain skills and knowledge

Margison (2004)
Credential hinted by Diploma is today very important.

In a Context of globalization: Circulation
- Identification
- Authentication
- Validation (Legitimacy and Acceptability Brown 2005)

Fighting credential fraud

Very difficult / Expensive process, no real existing methods (Today).
- Europe Bologna Declaration of June 1999
- Mobility, Standardization, recognition
- No Worldwide application
Background

- **Academic Knowledge**: The sum or range of what has been perceived, discovered, or learned in *Higher academic institution*

- **Academic Credentials**: Tacit and explicit knowledge gained/offered, granted by consensus from academic world

- Can we **automate** the Validation/Evaluation of **Academic Credentials** within a multitude of environments?

- Perception of this academic knowledge
  - Academic World (Internal) - Professional World (External)

- **Validation: cybernetic approach** (Argyris & Schon 1978)
  - Single loop: From academic world (International Diversity)
  - Double loop: Feedback and justification from domain expert (professional world)
Knowledge Management Architecture in organization

- Business Application Layer
  - E-Learning Management
  - Competence Management
  - Intellectual Property Management
  - Customer Relationship Management

- Personalized Knowledge Gateway
  - Knowledge Portal
  - Data and Knowledge Discovery
  - Collaboration Services
  - Expert Networks

- KM Services
  - Knowledge Map

- Organizational Taxonomy
  - Knowledge Map

- Document and Content Management
  - Knowledge Repositories
  - Web Browsers, Word Processors, E-mail Browsers, File Servers, DBMS, Multimedia Generators, Messaging Tools, and Internet/Intranet Services

- Information and Knowledge Sources
  - Bulletin Boards/Newsgroups
  - Databases
  - Electronic Documents
  - E-mails
  - Multimedia Files
  - Logged Chats

Knowledge repository
Spectrum coverage

Academic Material
- Textbooks
- Slides
- Handouts
- Exercises

Theories

Exercises
- Exams
- Reports
- Thesis
- Presentations

Applications

Professional Documents
- Use of Competence acquired during the working life
- Memo
- Documents
- Offers
- Procedures
Knowledge Conversion model

Nonaka et al, 1995
Five phase model of the organization knowledge creation process

- Share tacit explicit knowledge amongst students and faculty
- Start creating or eliciting (extract in quantitative way) the concept for that specific project
- Justification against literature survey and material covered over the course
- Build an archetype (their project)
- Cross leveling of knowledge (adding an assessment phase) among students and faculty

Help determine the validation criteria

Application to Academic knowledge
The Continuum models of Legitimacy and Acceptability

**Continuum of legitimacy**

- Highly legitimate
- Illegal

**Continuum of acceptability**

- High acceptability
- No acceptability

Ezell and Bear 2005; G. Brown: WES Oct 2005
Research
Motivation/ problem

- Investigating applicability of knowledge conversion model in the Field of Higher Education
- How can we help acceptability and legitimacy translations.
- Diffusion of knowledge in Higher Education establishments
- Coverage and feasibility of the domain selected: What are the specialized domains bounded by a given diploma
- Which standard, academic knowledge acquired by an individual can be benchmarked against?
Research
Motivation/ problem

- Attempt to identify through comparative studies how Academic documents (science: theories, assumptions, fundamental knowledge: i.e. higher education institution) feed onto commercial documents (business: models, practices, applied knowledge: i.e. spin-off of higher education institution)

- Can we use corpus linguistic methodology (Quirk, 1985) to facilitate the validation process of specialist Competences

- Attempt to relate Job offers and students academic credential language, by and/or across specialist domains.

- Collection of data and relevance of their representation (Individual and Temporal)
Research

Justification/Objectives

- Facilitate International nature of a recruitment process (Globalization)

- Try to reduce Fraud
  - Increase Recognition of Academic Credentials (+authentication)
  - Increase acceptability for a given category of Diploma

- Giving added value to the candidate academic background

- To find a way to ease the process of managing competences (HR)

- Externalize relationship between academic offering and business recruitment
Research Hypothesis

“Can we automate the validation of Academic Credentials?”

- Academic credential is a constantly evolving knowledge

- We have used a model for the Knowledge conversion from academic to business. (knowledge conversion model, Nonaka et al 1995)
  - Flow and adaptation of specialist knowledge from academic documents onto commercial documents
  - Understand and identify how academic knowledge is converted into knowledge used in a professional environment

- Extend Nonaka et al/s (1995) organisational knowledge creation theories (knowledge conversion model) into the area of Higher Education institution

- Need for Externalization of the tacit relationship between academic and professional world.

- Single/double loop approach of the AK Validation
Research Methodology

Grounded theory (finite setting) (Glaser and Strauss 1967/80)
- Theory is derived inductively from observation
- According to a specific research procedure
- It comes into being in an environment of qualitative field research
- Much empirical research starts with a set of hypotheses and tests them against empirical data
- Grounded theories are developed incrementally from empirical observation
- A candidate concept or proposition is discovered and integrated in the emergent theory

Case Methodology (non-finite setting)
- Yin (1994) identified five components of research design that are important for case studies:
  - study's questions
  - Its propositions, if any
  - Its unit (s) of analysis
  - The logic linking the data to the propositions
  - The criteria for interpreting the findings
Methodology
AK diffusion

Knowledge transfer and validation
Observational Study

Knowledge workers/Institution
Text Analysis

Diploma
Text Analysis

Professional world

Knowledge Flow and adaptation
## Methodology

### AK diffusion

<table>
<thead>
<tr>
<th>Agent A</th>
<th>Agent B</th>
<th>Elements of K-Repository</th>
<th>Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person</td>
<td>Person</td>
<td>Opinion, practice, know-how, lecture, discussion, dialogue</td>
<td>Observational study</td>
</tr>
<tr>
<td>Person</td>
<td>Organization</td>
<td>PhD Dissertation, Research Publications, technical reports...</td>
<td>Text Analysis</td>
</tr>
<tr>
<td>Organization</td>
<td>Organization</td>
<td>Specialist documents (i.e. technical documents, academic document)</td>
<td>Text Analysis</td>
</tr>
<tr>
<td>Organization</td>
<td>Worldwide</td>
<td>Specialist documents (i.e. technical documents, technology-specific documents, Diploma)</td>
<td>Text Analysis + Observational Study</td>
</tr>
</tbody>
</table>
Ontology creation process

Text Corpus

Corpus Analysis

Candidate Terms

Lexical/Semantic Patterns (Collocations)

Candidate Ontology

Intermediate Representation

Finalization (i.e. XML, WOL, ...)

Lexical Resource
BNC, ANC, ...

Term Base

Candidate Ontology

Outlook

Candidate Terms

Other Knowledge Sources

ECTS
Observational Study

A cybernetic approach (Shon & Argyris 1978) of academic credential validation

Scope of the study: IUM knowledge

ECTS
P.L.A.R.
I.C.E.
ACCEPT

Single loop
Validation
Observational Study

Single Loop Validation: acceptability of a Diploma European tools

- Lisbon Recognition Convention 1997
  - entry to higher education
  - study period taken in other countries
  - recognition of higher education credential

- Diploma supplement provides additional information (holder, level, content, result achieved ...)

- ECTS (89) European standardization to help students traveling through Europe during its study.
Observational Study

Single Loop Validation: Netherlands Example

- I.C.E. (Netherlands) Colo – IMG - Nuffic

<table>
<thead>
<tr>
<th>Level of comparison</th>
<th>Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>Acceptance</td>
</tr>
<tr>
<td>1970</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>

- Phase 1
- Phase 2
- Phase 3

Curriculum Equivalence

Partial equivalence
Difference accepted

Difference as an asset
Acceptance institutionalized

Mobility
Single Loop Learning

“Can we automate the validation of Academic Credentials (at an individual level) within a multitude of environments?”
Observational Study

A cybernetic approach (Shon & Argyris 1978) of academic credential validation

Scope of the study: IUM knowledge
Observational Study

Double Loop Validation IUM

- Alumni questionnaire
- Employer satisfaction survey
- Faculty body composed of professionals
- Inviting external lecturer
- Hosting Seminar and conference
Observational Study

A cybernetic approach (Shon & Argyris 1978) of academic credential validation

Scope of the study: IUM knowledge

ECTS
P.L.A.R.
I.C.E.
A.C.C.E.P.T.

Single loop
Validation

Double loop
Validation
Observational Study

- **Human Resource Departments**
  - Diploma validity assessment methods if any
  - Interest in the content of the study

- **External parameter**
  - Private or public company
  - The number of employee of the company
  - The country of the company
  - The level of the diploma undergraduate or graduate

- **Particularity**
  - 100% of the answers came from the private sector
  - Almost all respondents were from SME (from 2 to 1000 persons)
  - 96% in Monaco
Findings

Q4: Do you ask for the diploma at undergraduate level
- Always 54.84%
- Sometimes 19.35%
- Never 25.81%

Q5: at graduate level
- Always 80.65%
- Sometimes 3.23%
- Never 16.31%

Cumulated Average on the entire population UG + G
- Always 67%
- Always + Sometimes 80%
- Never 21%
Findings

- **Q6.1: Do you ask for the Original diploma**
  - Always 0.01%
  - Sometimes 51.60%
  - Never 48.39%

Cumulated Average on the entire population

- always - always 0%
- always - sometime 40%
- sometimes - sometimes 33%
- Never < 50%
Findings

- Q6.2: Do you Check/Verify the validity
  - Always 6.45%
  - Sometimes 22.58%
  - Never 70.97%

Cumulated Average on the entire population

- Sometimes 10%
- Never 90%
Findings

- Q 7.1: Do you request the grades  Never: 83.87%
- Q 8: Check the Content
  - Always 0.00%
  - Sometimes 48.39%
  - Never 51.61%

- How: Internet (97%), phone call (3%), email (0%)

Cumulated Average on the entire population

- Sometimes < 5%
- Never > 95%
Findings

- Q 9: ODIC (Online Diploma information Certification)
  - Always 100%
  - Sometimes 0%
  - Never 0%

Grades: Yes (32.26%) - No (67.74%)
Course Content Yes (64.5%) - No (35.4%)
Findings

- Importance of diploma (80%)
- Legality (<30%)
- Acceptability (<5%)
- Credential Evaluation method (100%)
Corpus analysis

“Historical study” Framework

- Method for automated corpora analysis (Historical Studies)

  Collect a random sample of text corpora in a domain (may include sub-domains). That of investigation: IUM Higher Business Education

- Frequency analysis for single and compound specialist terms

- Collect another random sample (job offer) and compare the analysis

- Assumption
  - Frequency is a correlate of acceptability (Quirk, 1985)
  - Text is a trace of knowledge
Corpus analysis

System Quirk
### Historical Study

#### Corpus organization: syllabi
219 syllabi, 272560 words 12506 unique => Granularity 4.5%

Top 5 single word terms with their collocations

<table>
<thead>
<tr>
<th>Terms</th>
<th>freq</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>906</td>
<td>Strategic, Global, Contemporary</td>
<td>Structure, Law, Venture Ethics, Strategy</td>
</tr>
<tr>
<td>International</td>
<td>621</td>
<td>Amnesty</td>
<td>Trade, Economy, Finance, Relations</td>
</tr>
</tbody>
</table>
| Financial   | 514  | Key, International                        | Indicators, Accounting, Analysis, Data, Forecasting, ...
| Management  | 483  | Assets, portfolio, financial, database    | System,                                 |
| Group       | 474  | Activity,                                 | Work, project, situation, dynamics, presentation, discussion... |
## Compound Terms

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Course Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>global marketing</td>
<td>case study</td>
</tr>
<tr>
<td>organizational behavior</td>
<td>grading scheme</td>
</tr>
<tr>
<td>linear programming</td>
<td>online assessment</td>
</tr>
<tr>
<td>consumer behavior</td>
<td>interactive presentation</td>
</tr>
<tr>
<td>multiple regression</td>
<td>group work</td>
</tr>
<tr>
<td>verb tenses</td>
<td>semester credits</td>
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<tr>
<td>linear regression</td>
<td>grading guideline</td>
</tr>
<tr>
<td>global branding</td>
<td>internal examiners</td>
</tr>
<tr>
<td>inferential statistics</td>
<td>project Team</td>
</tr>
<tr>
<td>global brand</td>
<td>guest speakers</td>
</tr>
</tbody>
</table>
Job Offer Text Analysis

Job offer corpus based on Monster.com
Using a small sample in business
8377 words - 1886 Unique, Granularity 22%

<table>
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<tr>
<th>Category</th>
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<tr>
<td>Business</td>
<td>169</td>
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<td>69</td>
</tr>
<tr>
<td>Sales</td>
<td>63</td>
</tr>
<tr>
<td>Team (practice)</td>
<td>25</td>
</tr>
<tr>
<td>Marketing</td>
<td>22</td>
</tr>
<tr>
<td>Financial</td>
<td>18</td>
</tr>
</tbody>
</table>
**Terminology overlap**

**Syllabus TOP 5 single words**
Based on IUM 2004 course offerings:
219 syllabus:
272,560 words
12,506 unique
Granularity 4.5%

<table>
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<td>483</td>
</tr>
<tr>
<td>Group</td>
<td>474</td>
</tr>
</tbody>
</table>

**Job offer TOP 6 Single words**
Based on Monster.com job offer web site
8,377 words
1,886 Unique
Granularity 22%

<table>
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**mutual information index/t-score**
Matching / Dismatching
Terminology overlap

Spectrum of shared term

Temporal parameter

academic

professional

KM, AI

AS 400 programmer

Terminology overlap

academic

KM, AI

AS 400 programmer

professional

Temporal parameter

Spectrum of shared term
Support Tool
IUMA / ODIC

Transcript detail:
Grades, Syllabi, POL ...

Related Course material:
Exercises, case study, exams ...

Student Transcript Corpus

Student Credential Ontology

Online Diploma Information Certification

www.m onaco.edu
Research Evaluation

- Attempt to establish research links between observational and historical studies
- Applicability (ies) of knowledge conversion model (Nonaka et al, 1995) in an academic context (contribution to theory)
- Research within computer mediated knowledge management field
- Observational study laid the framework for the conduct of our research
- Observational study highlighted the fact that there was a really strong explicit relationship inside academic world
- Observational study pointed out the possible lack of acceptability and authenticity (correlate with George brown 2005)
- The above has led us to examine the relation between academic and professional world, and how text-based knowledge diffusion may take place
- Our analysis shows that academic documents and job offers can be correlated on the basis of single word and compound terms (Contribution to practice)
Outlook

- Multi lingual knowledge diffusion
- Analyzes Across specialized domains
- Internal knowledge diffusion of
  - Other specialized domain (Science)
  - Other institution
  - Other job offer
- Diachronic study to evaluate this temporal parameter identified
- Implement Ontological engineering methodology in line with Web services to automate credential evaluation in job offers or candidate assessment.
Concluding Remarks

- A bimodal (observational and data-driven) research study was conducted
- Terminology for evolving fields (higher education institutions and business marketplace)
  - Finding and matching unknown terms between diplomas (course material...) and job offers (company documents...) may demonstrate how knowledge is cross levelled
- Taking into consideration the profile the students want to show
- Students that did not complete their studies may take advantage of such validation
  - Reflective of the (sub) domain(s) knowledge acquired (validation)
- Cohesion between academic offerings and marketplace demands
  - Attempt to demonstrate such relationship
  - Adaptation based on changing demand
- Future, integrated into HR management tools, web robots: new ranking
Postscript

E-Learning and Ontologies of Domain Knowledge

Mapping traces of knowledge, though AUTomated Organizational CARTography [AUTOCART]
IJIKM International Journal of Information, Knowledge, and management
Winter 2006 (under consideration)

Knowledge Dissemination and Validation: a Case of Academic Credentials
IRMA 2005, International Conference of the International Resources Management Association, San Diego, California, USA. May 15, 2005

The Practice of sharing specialist practice
Fall Conference - International Association for Computer Information Systems, Cancun, Mexico. IACIS 04

Computer-Mediated Extraction of Specialist Domain Practices
Annual Research Conference in Electronics, Photonics, Communications & Networks, and Computing Science, Hertfordshire, UK. PREP 04
Findings

- George brown findings in Australia & New Zealand (WES 2005)
  - 81% higher education verify the acceptability of a diploma
  - 77% higher education verify Authentication
  - 66% local recruitment agency does not verify the acceptability
  - 55% does not verify the authenticity
  - 70% accepted standard photocopy
  - 73% accepted education claims made by candidate in their CV without requiring further documentation.

- 2003 Cole, Field & Giles
  - Majority of employment evaluation were based on information provided in the CV, very little external validation were made.

- 2002 Christian and Timber study found that 52% of candidates had claim their partial degrees as full degrees.