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FINDING PATTERNS IN TEACHERS' AND STUDENTS' ICT USE

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UNIVERSITÉ

Grenoble CC () Alpes



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DAILY USE OF ICT IN EDUCATION...

- Which patterns may emerge from the analysis of this use?
- Use of diverse methods to uncover those patterns and a **multidisciplinary** approach (psychology, education, computer science, linguistics)



OVERVIEW

References: <u>https://</u> frama.link/cokleeco

1. DESIGN

2. ATTENTION

3. PRODUCTION



TEACHER



Representing routines



STUDENTS



Building constructivist environments



Supervising students



Philosophical discussion



Viewing MOOCs



Vita analysis



1. DESIGN

INSTRUCTIONAL DESIGN PATTERNS

- Instructional design is an overlooked question in classrooms
- Every teacher makes use of "routines" in classroom lessons
- Ways to express these routines with ICT support?





METHOD

| 3 | CORR. DEVOIRS | Le maître | contrôle | le travail fait 👘 | puis | les élèves | corrigent | le travail |
|----|---------------|------------|-------------|-------------------|-------------|------------|-------------|-----------------------------|
| 4 | TRANSITION | Le maître | ordonne de | faire des actions | pour | | préparer | la séq. suiv. |
| 5 | NYELLE LEÇON | Le maître | présente | la leçon | pendant que | les élèves | écoutent | attentivemen <mark>t</mark> |
| 6 | PRÉSENTATION | Le maître | présente | un matériel | pendant que | les élèves | participent | en répondan <mark>t</mark> |
| 7 | EX. RÉPÉTITIF | Le maître | interroge | rapidement | pendant que | les élèves | répondent | sur ardoise |
| 8 | EX. CONTROLÉ | Les élèves | travaillent | sur des exercices | pendant que | le maître | contrôle | le travail |
| 9 | EX. GUI DÉ | Les élèves | travaillent | sur des exercices | pendant que | le maître | guide | les élèves 💦 |
| 10 | EXPOSÉ | Un élève | présente | l'exposé | pendant que | les élèves | écoutent | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |

Context: Novice (*N*=8), experienced (*N*=10) and expert (*N*=9) teachers used the software to plan lessons, either from the predefined schemas or new ones.



RESULTS

- Experienced and experts were more
 action-based (choosing and redefining existing actions) than novices were
- The more experienced, the more novel actions were built
- Experienced and experts can use their action repertory; novices cannot





DISCUSSION

- Teachers design courses in using efficient routines to lessen their cognitive load and make them available to other duties: assessment, interaction with students. In short, individualization
- Working and reflecting on routines help teachers become more efficient



Which instructional design environment would you use, if any?

Readings

Musial, Pradère & Tricot (2012) (in fr.) Sobreira & Tchounikine (2012) Law (LDSHE) : <u>https://ldshe.cite.hku.hk</u> Hernandez-Leo et al. (LDShake) : <u>http://ldshake.upf.edu</u>





1. DESIGN

UNDERSTANDING CONSTRUCTIVISM TO BUILD LEARNING ENVIRONMENTS

Constructivism is now mainstream in education, despite some criticisms
 (Kirschner *et al.*, 2006; Petraglia, 1998)

 Research question: How university students apply constructivist principles to design computer-based environments?





METHOD

- Context: 37 students built constructivistbased learning environments in a course unit, using ToolBook, an authoring environment
- Instrument: The Crossley and Green (1990) method was used, prescribing 3 main principles:
- 1. **Authenticity**: the learning activities have to be related to daily life
- 2. **Manipulation**: the learner has to manipulate knowledge objects, take initiatives, not just read-and-repeat
- 3. **Interactions**: foster learner's participation and interactions outside the computer environment (with peers, teacher)



RESULTS

#1 & #2 Principles (Authenticity & Manipulation)

| Principle 1 | | Principle 2 Representations | | | |
|--------------|-----------|-----------------------------|------------|------|--|
| Authenticity | Interpret | Move symbols | Manipulate | Cons | |
| Tutorial | 7 | 1 | 5 | (| |
| Game | 2 | 5 | 2 | (| |
| Authentic | | 0 | 11 | | |
| Total | 10 | 6 | 18 | 3 | |

#3 Principle (Interactions)

 23 (out of 37) environments do not plan any interaction between learners or between teacherlearners. 11 of them mention "come and fix" interactions





DISCUSSION

- Building constructivist environments is not an obvious activity
- The advent of "programming activities" (e.g., Scratch-based) makes game building easier.
 But their paradigms remain difficult to grasp and to implement



 How would you manage to design such constructivist games/environments? To which purpose?

Further Reading

Kirschner *et al.* (2006) Tobias and Duffy (2009)





TEACHERS' ATTENTIONAL PATTERNS

- Research questions: How do teachers supervise their classroom? Which attentional patterns may reveal supervision strategies? Attention is an important yet transient and mainly unconscious process. Need for new tools to study it
- Research Funding: Pôle Grenoble Cognition of the Univ. Grenoble Alpes
 <u>http://www.grenoblecognition.fr</u>





Dessus, Luengo, and Cosnefroy (2016)

METHOD

- **Context**: 4 elementary teachers (2 novices and 2 experienced) wore mobile eye trackers during maths lessons
- Report of which pupils are most often gazed, and which are their profile (in terms of academic performance and **behavior**)

Novice-expert comparison

Dessus, Cosnefroy, and Luengo (2016)



RESULTS

% GAZES TO STUDENTS

N GAZES BY STUDENT TYPE

Students Behavior score

Students Academic Score

Dessus, Cosnefroy, and Luengo (2016)

TEACHER #4: EXPERIENCED





TEACHER #2: NOVICE





DISCUSSION

This experimental device sheds light on "old school" hypotheses on teacher cognition like teacher's "withitness" or "immediacy"



Which ethical concerns this kind of studies, if furthered, may entail? How to prevent them?

Further reading: Lang *et al*. (2017)





LEARNERS' ATTENTION PATTERNS

- MOOCs (Massive Online Open Courses) are one of the best recent opportunity to share and build knowledge
- However, MOOC attrition rates are high
- How students are attentionally engaged in MOOC lectures? Does teacher presence help or hinder learning?
- Partly funded by the CEEGE ANR Project of the Fr. Research Ministry





Lassance, Guntz, Filgueiras, Dessus, & Crowley (subm.)



METHOD

- Context: 24 participants (students)
 viewed a video capsule on informatics (semantic web) and their behavior was recorded with this device
- Comparison: Capsule with vs. without teacher
- Measures: Eye-gaze, facial expression and body posture, opinion-based measure, learning outcomes (MCQ and problem solving)



RESULTS

Gaze distribution. Slide content gazed
 75% of time in both conditions, but
 teacher attracted 10% of the gazes
 Learners satisfaction. The without teacher capsule was rated higher, with a
 greater perceived learning
 Learning outcomes. Learners
 performed equally in both conditions

Lassance, Guntz, Filgueiras, Dessus, & Crowley (subm.)

DISCUSSION

- MOOC capsules with an overlaid instructor who doesn't interact with
 the content are less efficient than those with content only. The information delivered by the teacher in person is redundant
- ??

Any ideas on the use of this device to work on new research problems?

Further reading: Guntz *et al*. (2017) using the same device to analyze chess problem solving

Lassance, Guntz, Filgueiras, Dessus, & Crowley (subm.)

DISCOURSE PATTERNS IN PHILOSOPHICAL DISCUSSIONS

- Analyzing the utterances of discussions (e.g., in forums) is a **cumbersome** and **cognitively demanding task** for teachers
- How to automatically measure the quality of contributions of discussants in a philosophical debate?

AUTOMATED SEMANTIC ASSESSMENT

- Use of advanced Natural Language
 Processing techniques
- Automatically accounts for the semantic similarity of words and by extension, sentences, paragraphs, texts, thanks to factorial analyses

METHOD

Context: A philosophical discussion across 442 utterances (theme: when do you think something is unfair?), involving 11 Grade-5 pupils led by a philosopher. Some students were playing specific roles (president, secretary)

Research questions: Can we automatically weigh participants contributions? analyze themes? System: readerbench.com

Dessus, Simon, Dascalu and Trausan-Matu (2017)

PARTICIPANT CONTRIBUTION TO THE DISCUSSION

DISCUSSION BY THEME

24 V

- MOOCs, elearning, eTextbooks...
- writing

AUTOMATED CV ANALYSIS

- Any human resources expert can browse CVs and pick the most attractive ones (both formal and content-focused).
- Can we even build a system to automatically check this so that we can screen our CV?

Research funding: EU H2020 RAGE Project <u>http://rageproject.eu</u>

Gutu, Dascalu, Trausan-Matu & Lepoivre (2017)

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METHOD

Context: A collection of 52 vitas has been assessed by experts (+/-, form/content) **Research question**: Can some features textual enhancements; - positive wording; word complexity; word coherence (keywords related to the whole CV), etc. be automatically screened in the same way experts did?

Gutu, Dascalu, Trausan-Matu & Lepoivre (2017)

| Handstory West india is | MONSIEUR 算能能能能能能能 | |
|--|---|------------|
| Directeur général | -A advertised and a start of the start of th | |
| Pour plus de détails, voir mon CV en ligne (tajét (tajét)) a télépétet | and the second | |
| EXPÉRIENCES | and a star and the second second and the second | |
| Key Account Manager | internetististe personal setter internetististe personal and the personal and | 1995 |
| Responsable Europe des clients industries Lourdes représentant 50 MC : ARCELORMITTAL, PSA, 1 GOBAN, DCNS | war were the the the the the the the the the th | |
| Définition d'une stratègie de reconquête. Créer le besoin et négocier à haut niveau. Mise en place d'indicateurs de performance : Taux de service, Taux de satisfaction, Taux de couverture Elaboration et mise en place d'une structure et des outils déciés à la productivité client : 1 recrute | FORMATION | |
| néalisé pour coordonner le service. Mise en place d'une Business Review clients avec QIKView. Contrats intégralement re-signés. CA e de 8% pour le principal client. Marge brute en hausse. | 1974/1977 CAP MENUISIER AGENCEMENT OBTENU EN 1977 | |
| Directeur de centres de profits DescurséGabaud - LYDN (France) - CDI - Novembre 2002 à Novembre 2010 | 1982/1983 BP MENUISIER AGENCEMENT OBTENU EN 1983 | |
| Pour la filiale ROBOFLUX - 30 personnes - 6 MC - Positionnement : Directeur de filiale. Fusion avec MLUUT, Diaenostic et mise en place des recommandations pour effectuer la fusion avec | EXPERIENCE PROFESSIONNELLE 20 ANS C | OMN |
| JALLUT. Elaboration d'un nouvel organigramme et recrutement des cadres opérationnels. Mise er plan stratégique commercial et financier. Mise en place d'une nouvelle organisation du plan de ve supply chain. Mise en place et suivi du recouvrement client. | DEPUIS 2012 COMMERCIAL ISOLATION DE LAINE MINERALE | STE |
| Pour la Skale jALLUT - 17 personnes - 3 MC Positionnement : Directeur d'agence. Fusion avec PORTRON, Réorganisation commerciale par secteur d'activité clant, la céléphice dei | VENTE AUPRES D'UNE CLIENTELE PROFESSIONNEL, BAT PUBL | C,BA |
| Responsables produits Création du poste approvisionnement et logistique. RCAI positif en 6 mois Réduction du découvert client. Pour la filiale PORTRON - 7 personnes - 1,4 MK. Positionnement : Responsable d'agence. Diagnos | 2011/2012 COMMERCIAL STE SEMI CELLISOL VENTE DE OUA | TE D |
| en place des recommandations concernant le service client. Ré-organisation de la supply chain-Sr expédition. | 2010 / 2011 COMMERCIAL TRAITEMENT DE L'EAU STE CULLIGAN 2 | 12 LE |
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| eagen Metrology « EXON (France) » COL + Avil 1999 à Octobre 2002 Développement du réseau de distribution régional. - Management d'une équipe projet autour du recensement des distributeurs de la région pour ef | eduerun 2006/2008 COMMERCIAL MENUISERIE ALU/PVC SAS DUVAL72 LE | MAN |
| recentrage de la politique de distribution, tivaluer et mettre en place la politique commerciale idoi et suivre les distributeurs dans la phace de démarrage. Mise en place d'une équipe support techn commerciale. | 2002/2006 COMMERCIAL MATERIELS INDUSTRIEL STE EURO MAT | 72 LE |
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| intreprise | 1993/1994 REVENDEUR MACHINES A BOIS 85 LA ROCHE SUR YON | oozer K |
| Finance d'entreprise ***** Optimisation organisationnelle ***** Négociation commerciale ***** | 1989/1993 COMMERCIAL MULTI CARTE STE STM ETS VASSEUR ET | s GU |
| Drot commercial français +++++ | 1986/1989 ARTISAN MENUISIER 78 HOUILLES | |
| Suite Office +++++ QBM/few +++++ | 1984/1986 CONDUCTEUR DE TRAVAUX MENUISERIE STE ADMG 93 | LE B |
| SAP +++++ Google enterprise +++++ Business Object +++++ | 1983/1984 MENUISIER HQ ETS CHENIER | |
| Langues | 1981/1983 MENUISIER 2" ET 3e ECHELON STE MARTINASSO 06 ST | LAUR |
| Français +++++ Anglais +++++ | 1977/1981 MENUISIER 1" ET 2" ECHELON SA LELIEVRE 1974 1977 | APPR |
| (a) | 1977/1981 MENUISIER 1" ET 2" ECHELON SA LELIEVRE 1974 1977 / (b) | 1.PI |

Side-by-side comparison of CVs being classified as (a) positive versus (b) negative. Some details were blurred for anonymisation.

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RESULTS

The most predictive indices of CV quality

- Quality is better predicted by content than by formalcentered features
- Formal: Simple and readable font types
- **Content**: Number of adverbs; number of positive words; length of sentences expressing achievements; cohesion flow

Gutu, Dascalu, Trausan-Matu & Lepoivre (2017)

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Personal Statement

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DISCUSSION

- Textual analysis is a powerful yet simple way to **screen** a wide range of educational material: handbooks, students' written production
- Assessing the emotional charge of any text is tricky: context counts, and a proposition with positive + negative words isn't neutral ("not wonderfully interesting" is negative)(Pulman, 2014)

Which educational uses would you envision from "textual emotion analysis"?

Further reading:

ReaderBench CV Video demo: https:// www.youtube.com/watch?v=Nsd40AmQUKE

Personal Statement

Education

1991-1995 1996 - 2000

Experience

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USING ICT IN EDUCATION

- Digital devices can both be tools (to act upon a situation) and instruments (to get information from a situation)
- Importance of interdisciplinary research to uncover use patterns
- Recent focus on emotions and educational data mining...
- ... for large scale situations (MOOCs, universities)

Further reading: Innovating Pedagogy Reports http://www.open.ac.uk/blogs/innovating/

BUT... IT'S A DELICATE ISSUE

- ICT use raises likely ethical and political concerns researchers and teachers have to address
- Omputers as surveillance devices?

Further reading:

Drachsler & Greller (2016) Morozov (2013) Watters' blog at <u>http://audreywatters.com</u>

Eye by Delwar Hossain from the Noun Project

THANKS FOR YOUR ATTENTION! ANY QUESTIONS?

@pdessus http://pdessus.fr References: <u>https://frama.link/cokleeco</u>

THANKS TO: James Crowley, Mihai Dascalu, Erica de Vries, Thomas Guntz, Gabi Gutu, Laura Lassance de Oliveira Morais, Jean-Pascal Simon, Stefan Trausan-Matu, and others...

