

# FIE 2019 (Cincinnati)<sup>1</sup>

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18–20 October 2019

<sup>1</sup>But actually across the Ohio on Northern Kentucky.

# Contents

<b>I</b>	<b>Thursday 18 October 2019</b>	<b>4</b>
<b>1</b>	<b>Section T1D: Computer Science Issues</b>	<b>5</b>
1.1	Integration of Software Testing to Programming Assignments: An Experimental Study . . . . .	5
1.2	A Case Study in Constructivist Pedagogy . . . . .	5
1.3	Understanding Programming Concepts: the case of the Variable . . . . .	6
1.4	How automated Feedback is Delivered Matters: Formative Feedback and KT . . . . .	6
1.5	Coral . . . . .	6
<b>2</b>	<b>Section T2D: Computer Science Issues</b>	<b>7</b>
2.1	Integrating Security into Computer Science Curriculum . . . . .	7
2.2	Does Cyclic Learning have Positive Impact on Teaching Object-Oriented Programming? . . . . .	7
2.3	Teaching Parallel Programming to Freshmen in an Undergraduate Computer Science Program . . . . .	8
2.4	Connections and Influences Among Topics of Learning How to Program . . . . .	8
2.5	Quantifying the Relationship Between Projects, Assignments and Grade in Computer Science I . . . . .	8
<b>3</b>	<b>Section T3B: Learning Analytics 1</b>	<b>10</b>
3.1	Semi-automated Analysis of Reflections as a Continuous Course Improvement Tool . . . . .	10
3.2	Cognitive and Social Interaction Analysis in Graduate Discussion Forums . . . . .	10
3.3	Quantitative Analytics in Exploring Self-Regulated Learning Behaviors: Effects of Study Persistence and Regularity . . . . .	11
3.4	A Data Mining Approach to Understanding Curriculum-Level Factors That Help Students Persist and Graduate . . . . .	11
3.5	What are the Non-majors Looking for in CS Classes? . . . . .	12

<b>4</b>	<b>Section T4B: Learning Analytics 2</b>	<b>13</b>
4.1	Assessment of Self-Regulated Learning in Service-Learning Project in a First-Year Seminar in Engineering Course . . . . .	13
4.2	Refining Skill Classification with Interactive Machine Learning . . . . .	13
4.3	Understanding Student Usage of an Online Interactive Linear Circuit Analysis Textbook . . . . .	14
4.4	Understanding the Student Dropout in Distance Learning . . . . .	14
4.5	Debate with Maps: A new Pedagogical Architecture . . . . .	14
<b>5</b>	<b>Plenary</b>	<b>15</b>
5.1	Introduction . . . . .	15
5.2	Does Space Matter?: Tim Reynolds . . . . .	15
<b>II</b>	<b>Friday 19 October 2019</b>	<b>17</b>
<b>6</b>	<b>Section F1D</b>	<b>18</b>
6.1	ICT skills comparison: the before and the after of introduction of the EHEA in Spain . . . . .	18
6.1.1	ICT Professional . . . . .	18
6.1.2	Skills acquired during studies . . . . .	18
6.1.3	What they haven't acquired . . . . .	18
6.1.4	Technca; knowledge . . . . .	18
6.1.5	Management . . . . .	19
6.1.6	Job Equality . . . . .	19
6.1.7	Should universities teach ethics/deontology . . . . .	19
6.1.8	Impact of EHEA/Bologna . . . . .	19
6.2	Outlining Software Project Management Education by Surveying Educators . . . . .	19
6.3	Using Personas as Curricular Design Tools: Engaging the Boundaries of Engineering Culture . . . . .	20
6.4	A UK Case Study on Cybersecurity Education and Accreditation . . . . .	20
6.5	Service-Oriented Reference Architecture for the Development of Context-aware Learning Environments . . . . .	20
<b>7</b>	<b>Section F2D: Ethics</b>	<b>21</b>
7.1	An Ethics Curriculum for CS with Flexibility and Continuity . . . . .	21
7.2	Training Writing Tutors to Improve Their Support for Engineering Students' Technical Reports . . . . .	21
7.3	Interdisciplinary Agile Teaching . . . . .	22
7.4	What Students Learn and Take Away from a Student-Centered Course on Communication and Professional Skills: Analyzing the Content of Students' Self-Evaluations . . . . .	22
7.5	The Effect of Preferred Leadership Role and Preferred Team Leadership Structure on Students' Perception of Team Processes and Outcome . . . . .	22

<b>8</b>	<b>Section F3D</b>	<b>24</b>
8.1	Learner model and prediction of the learners understanding degree using the neural networks . . . . .	24
8.2	Using Visualization to Reduce the Cognitive Load of Threshold Concepts in Computer Programming . . . . .	24
8.3	Design Heuristics to Support Cohesion within Online Collaborative Learning Groups . . . . .	24
8.4	Took a MOOC. Got a Certificate. What now? . . . . .	25
8.5	Analysis of classifiers in a predictive model of academic success/failure . . . . .	25
<b>9</b>	<b>Section T1D</b>	<b>27</b>
9.1	A Pilot Study of Developing Introductory Course in Data Analytics and Business Intelligence . . . . .	27
9.2	Improving integrated education of data science and information security through cross-curricular activities . . . . .	27
9.3	Targeted Curricular Innovations in Data Science . . . . .	28
<b>III</b>	<b>Saturday 20 October 2019</b>	<b>29</b>
<b>10</b>	<b>Section S1A</b>	<b>30</b>
10.1	Using ComputationalMethods to Analyse Educational Data . . . . .	30
<b>11</b>	<b>Section S2E</b>	<b>31</b>
11.1	FITech University network . . . . .	31
11.2	Effectiveness of a mailing list for African-American Computer Scientists . . . . .	31
11.3	SIMROAA: Milti-Agenr Recommendation System for Recommending Accessible Learning Objects . . . . .	31
11.4	Women in CS: changing the women or changing the world . . . . .	32

**Part I**

**Thursday 18 October 2019**

# Chapter 1

## Section T1D: Computer Science Issues

### 1.1 Integration of Software Testing to Programming Assignments: An Experimental Study.

Team from São Paulo: presented wasn't clear on details, and gave `gustavo.avellar@usp.br` as the lead.

Testing is normally addressed as a separate topic. We want to integrate testing and programming.

**RQ** How is performance in programming affected when programming is integrated with software testing.

Three groups: Kruskal–Wallis  $p = 0.019$ .

1. Ad hoc: final score 71%
2. Instructor provided: Final score 93%
3. Student-written: final score 89%

19 students: 8 in computer engineering; various other backgrounds. Only 16 were valid completers.

### 1.2 A Case Study in Constructivist Pedagogy

Liberal Arts College, 2500 students. Graduate 20–30 majors a year. Computer Organisation is a required 300 course, the only required one that deals with systems etc

LO's for Programming Project was to reinforce course concepts: computer arithmetic, assembler/machine language, program execution, memory hierarchy. Also to enhance CS knowledge and skills.

So the project is to build a simulated computer. Part 1: ALU/binary tools, Part 2 Assembler. Part 3 CPU simulator, Part 4 Cache memory simulation (a generic class with many options). Note that Part 1 feeds into Part 3, which Constructivist Theory likes. This division into parts, and sample code/tests, is “scaffolding” that Constructivist Theory likes. Students encouraged to work in pairs.

Full survey in the paper. Based on the results, the coursework is successful.

### **1.3 Understanding Programming Concepts: the case of the Variable**

My job is an instructor on basic programming at U. Namur. Used Dehnadi’s CI methodology. Summer class (optional) 4h theory, 3h practical. Test 0 before summer school, 1 before intro class on variables, 2 before practical and 3 at end.. 108 students (64 CS and 44 Business Engineering). 8/11 (total 19) females.

### **1.4 How automated Feedback is Delivered Matters: Formative Feedback and KT**

Instructor sets, student works, we grade. Very waterfall.

Hence a microservice for LMS (Canvas) to provide feedback. Based on Gitlab. All tests are sandboxed, and we report mOSS cores.

### **1.5 Coral**

This was a highly visual education-focused tool.

**Q** Evidence that flowcharts work.

**A** No hard evidence, but students like it.

## Chapter 2

# Section T2D: Computer Science Issues

### 2.1 Integrating Security into Computer Science Curriculum

Onyeka Ezenwoye, Augusta University. Problems: lack of attention. Look at growth in CVE datasbe: 6447 in 2016, then 14641, 16514 and 13078 so far in 2019. Three approaches to adding security.

- Add a security course.
- Have a security track
- Integrate it into every course

We do third, using concrete examples and reported vulnerability types. In fact, this doesn't require significant retooling of the faculty. For example, can do XSS in the Web design course, etc. Also `strcpy` in C/C++ programming, SQLI in databases. Note that a lot of what happens is variations of injection.

**Q** Effectiveness?

**A** Not yet.

**Q** You're not teaching all these courses yourself!

**A** No, but this is part of a curriculum redesign.

### 2.2 Does Cyclic Learning have Positive Impact on Teaching Object-Oriented Programming?

Babes-Bolyai. Map ACM curricula into this approach. 2010 cohort was sequention, later were cyclic.



**Advantages** More terms and concepts; application development is feature driven, concept maturity

**Disadvantages** Lack of deep learning; good students feel held back; some students just regurgitate templates.

## 2.3 Teaching Parallel Programming to Freshmen in an Undergraduate Computer Science Program

Henrique Cota Freitas (Pontificia Universidade Católica de Minas Gerais, Brazil).

Idea “Introduce students to multi-core processors and they will develop parallel software” — reality is different. Note that there is parallelism everywhere: look at a supermarket.

Our context is C and sorting algorithms. “Talk to the Programming lecturer” is easier said than done.

**Q** Is his just lectures, or do freshmen actually write parallel code?

**A** During the labs they do parallelise code.

## 2.4 Connections and Influences Among Topics of Learning How to Program

Yorah Bosse (University of So Paulo & Federal University of Mato Grosso do Sul, Brazil). I teach at MG and do a PhD at SP.

Collected information from diaries by programming students. Classical example is “are parameters variables”. Also `count=count+1` as confusing.

**Q** How did you get your list of concepts and connections?

**A** From reading the diaries.

**Q** Do professors and students disagree.

**A** Not so much on connections, but whether they’re difficult.

## 2.5 Quantifying the Relationship Between Projects, Assignments and Grade in Computer Science I

Amruth N. Kumar (Ramapo College of New Jersey, USA). This is about CS1. Need a B to persist with CS, correlated with graduation GPA, but has high attrition (28%).

**Closed-Lab** Lecture followed by lab in same period. Cognitive Apprentice model [CBN89]

**Proecjts** 10/semester

**Code-tracing** 12/semester, using `problets.org`. Pretest on various concepts.

Course grade  $0.862 + 0.29 * \text{project grade}$ . Some really good graphs. Code tracing has a weaker correlation.

**Q** How do you motivate if the projects don't affect the grade?

**A** I tell them they'll lose grades, but I don't need to apply this.

**JHD** I do the same.

## Chapter 3

# Section T3B: Learning Analytics 1

### 3.1 Semi-automated Analysis of Reflections as a Continuous Course Improvement Tool

Nasrin Dehbozorgi (University of North Carolina at Charlotte (UNCC), USA).

Creating a homogenous learning experience for all students in the classroom.

Minute Paper (MP): two questions

1. What was the most important thing you learned?
2. What was the most challenging thing you learned? (especially helps the instructor)

We use Digital MPs, via Google Forms in our case. Use the same prompt every week, so they are prepared for the questions. The students' self-report of mastery agrees that

**Q** Is “Bag of Words” sufficient?

**A** There probably are more features, but this works for us.

### 3.2 Cognitive and Social Interaction Analysis in Graduate Discussion Forums

Singapore Management University.

3 hour sessions of lecture+lab+case study+... Looking for student-student interactions as well as student-teacher. Could be f2f, but this paper focuses on on-line. Note that a discussion forum allows time to reflect.

Use the “Community of Inquiry” framework [GAA99].

1. Just read the message
2. Simple responses
3. Deep thought

Course was on text analytics, so last week's posts were raw material for the next week.

Next steps include automation, and a larger cohort.

### 3.3 Quantitative Analytics in Exploring Self-Regulated Learning Behaviors: Effects of Study Persistence and Regularity

Cheng-Yu Chung (Arizona SU).

QuizIT is a self-assessment platform. We applied it to CS1. Few people apply unsupervised quantitative analytics for exploring potential self-regulated learning patterns.

### 3.4 A Data Mining Approach to Understanding Curriculum-Level Factors That Help Students Persist and Graduate

From San Francisco State University.

The graduation rate for FFTF (first time full time freshmen) at 4-year institutions is 40.6%. White 45.2%, Hispanic 31.7%, African American 21%. The metro college success program seeks out socio-economic vulnerable students and supports in their first two years.

- Timing of first (non-remedial) maths course. Simple  $\chi^2$ . Clearly data show earlier=better for graduation rate.
- First Metro Foundation course. Again  $\chi^2$ .
- What courses they took — data mining. In fact persistence in any three-course sequence is what counts whether Metro or not.
- ...

Even 7th term persistence only gives 75% graduation rate.

**Q** Any influence on the curriculum as such?

**A** No, but we compare students following similar routes.

**Q** Gender?

**A** Slightly more female than male, but not a significant factor.

### **3.5 What are the Non-majors Looking for in CS Classes?**

“Broadening computing skills” was a major theme. Hence courses should have breadth of application development, introduction to computational tools, and hands-on project development. They want to work with people from different majors (unlike CS students).

**Q**

**A**

## Chapter 4

# Section T4B: Learning Analytics 2

### 4.1 Assessment of Self-Regulated Learning in Service-Learning Project in a First-Year Seminar in Engineering Course

Wookwon Lee, David Gee and Saeed Tiari (Gannon University, USA).

There is general research in engineering education about seniors/freshmen, but not w.r.t. SRL: hence this work.

This Service Learning Project is a mandatory part of the coursework. Limited technical guidance by instructor. Teams of 5 works for first five weeks on a proposal presentation. Then entire class (20–30) on implementation.

Project was “zero hunger”: a solar-powered food dehydrator. Required  $\leq 250$ \$, eco-friendly, innovative.

Survey instrument was 10 categories, a subset of Engineering Design Metacognitive questionnaire. Our results are pretty similar to previous work on seniors. Therefore we conclude that SRL is relevant at all levels.

### 4.2 Refining Skill Classification with Interactive Machine Learning

Brandeis.

We are interested in making ML human-understandable. Can we quantify “understandability”.

Data is from Webwork, 2 years of intro calculus in a large university. Questions manually labelled with skills. Managed to improve the tagging and it now correlates well with performance. Ongoing work to incorporate this in our CalcTutor system.

**Q** Weighted tagging?

**A** Nice idea, but a lot of effort, both bootstrapping and ongoing.

**Q** What's the use of tagging exercises?

**A** Currently, student perceives needs — “give me chain rule questions”. But ideas in development.

### **4.3 Understanding Student Usage of an Online Interactive Linear Circuit Analysis Textbook**

Team from ZYbooks. Interactive textbooks. Homework is only useful with feedback. Our feedback is autograded with immediate feedback. Our main aim is to present analytics to the instructor.

**Q** Does this help student cut both study hours?

**A** Good question.

### **4.4 Understanding the Student Dropout in Distance Learning**

Myke M. Oliveira (Federal University of Rio Grande, Brazil) + coauthors including Cambridge.

Dropout rates are a real problem. Used data from two postgraduate programmes of Brazilian Open University. Whole bunch of algorithms. 90 and 76 students, but over 200K items from LMS. “Extra trees” wins: F1 of 0.94. Aim now is to actually make it predictive.

**Q** Which features are most important?

**A** The ones (c. 10) I have listed.

### **4.5 Debate with Maps: A new Pedagogical Architecture**

Each student makes his/her own map. Note that the reviewer for the students' [concept] map might also change his own map (about 10%). We wanted to verify the effectiveness of distributing reviewers.

# Chapter 5

## Plenary

### 5.1 Introduction

“We shape our buildings: thereafter they shape us” — WSC.

### 5.2 Does Space Matter?: Tim Reynolds

My speciality is science and technology for Higher Education in North America. I always ask “what is the culture of learning at your institution” — “is it changing, how, and who is leading the charge”. I live in Lawrence, Kansas: example of chant where almost no-one knows the original. Space is a tool, and tools are not solutions. In the US, over 50% of spaces are over 25 years old, and over 50% of them are over 50 years old. We need to design for sustainability. The backlog of deferred maintenance in the US HE sector is \$100/ft<sup>2</sup>.

Enrolment is up, but funding/student is falling. Compares (with pictures) 100 years of aerospace progress with 100 years of lecture hall space progress. WE are moving from “stand and deliver” to active/blended/collaborative learning. Traditional learning students are 1.5 times more likely to fail than active/blended.

New Texas A&M Engineering: no room > 96, most 48. Got a new table designed. Tablet-chairs are 16–19 sqft/student; active/blended is 22–32. Design by theme, e.g. strain lab, rather than by subject. Every maker space we design is different.

**Q** You showed a Google space, but it has nothing like the turnover of universities.

**A** True, but we can still use for inspiration.

**Q** Safety? Active shooters?

**A** We teach “hide/run/fight”, and the “hide” is difficult. But campus police like the transparency, compared to old buildings.



**Q** Finance?

**A** PFI exists (and is common for dorms) but I don't recommend it. I talk a lot to donors.

**Part II**

**Friday 19 October 2019**

# Chapter 6

## Section F1D

### 6.1 ICT skills comparison: the before and the after of introduction of the EHEA in Spain

Ariadna Llorens Garcia UPC + colleagues. Working on this for 10 years. EHEA = European Higher Education Area. Spain's first decade 2008–2018. We asked ICT sector in Spain what they wanted from recently graduated engineers. Sent to 1500 professionals, and 183 responses. This was Noember 2017-January 2018, very similar to one done 10 years ago.

#### 6.1.1 ICT Professional

Teamowrk was top in both, and generally similar.

#### 6.1.2 Skills acquired duringstudies

Learning, obtaining information and analytical thought were top 3 (in different orders) in both 2008 and 2018. Segmenting between computing engineers and telecoms engineers gives minor differences

#### 6.1.3 What they haven't acquired

Negotiation, Leadership, Customer Orientation were top 3 (in different orders) in both 2008 and 2018.

#### 6.1.4 Technca; knowledge

10 years ago was Internet, Telecoms and programming: now Security, Data analysis and internet Technical knowledge market lacks are Secirotly (25%), Data Analysis ad Energy.

### 6.1.5 Management

Project Management and managing teams are the top two in the same order, both years.

### 6.1.6 Job Equality

New question: Do you care: 47% yes, 27% No, 26% don't know.

### 6.1.7 Should universities teach ethics/deontology

86% yes.

### 6.1.8 Impact of EHEA/Bologna

41% don't know, 42% yes, 17% no.

**JHD** Not surprised by little knowledge of EHEA, same for accreditation with us.

**A** Thanks - talk afterwards.

## 6.2 Outlining Software Project Management Education by Surveying Educators

Maria Lydia Fioravanti (USP, Brazil).

Dissociation between theory and practice discourage students. Lists various studies about education versus industry needs. Used questionnaire guidelines of [Kas05]. Many mailing lists, but 51 responses (only Brazil and USA).

1. Who is teaching: 63% had doctorates. 28% had industrial knowledge, and 36% had educational knowledge.
2. What courses: 30% CS, 25% IS, 11% SE. 69% had a dedicated course.
3. Topics
4. teaching approaches: 34% traditional, 32% problem-based, 17% active etc.
5. supporting resources: 39% slides, 36% LMS, 33% videos.
6. Assessment strategies: 44% toy projects, also homework and presentations.

Interaction with professionals was valued. There is a lot needed, e.g. shift to active learning.

**Q** Did you collect industry expectations?

**A** (unclear).

### **6.3 Using Personas as Curricular Design Tools: Engaging the Boundaries of Engineering Culture**

Desen S. Ozkan colleagues (Virginia Tech.).

Very homogeneous student body. Recruitment is better than retention. NFS project. Last main curriculum review was in 1989, when CS joined EE (department is 80-90 faculty). Want to have multiple pathways, so developed personas. See Alan Cooper's "The inmates are running the asylum". So we wanted personas with both personal (including background) and career goal features. Currently gendered names — need to change this. Faculty are seeing personas that don't reflect themselves.

Future work on names etc., but also hiring a new undergraduate director!

**Q** Does moving to gender-neutral change the persona?

**A** Yes, deliberately so.

### **6.4 A UK Case Study on Cybersecurity Education and Accreditation**

Tom Crick, JHD, Alastair Irons, Tom Prickett.

### **6.5 Service-Oriented Reference Architecture for the Development of Context-aware Learning Environments**

Introduces "u-learning" [ubiquitous]. Context sensitive learning environments is a difficult task. [5]. We therefore need a reference architecture [9,10]. MOA is designed using the Pro-SA process for developing reference architectures.

1. systematic literature mapins. 157 works on u-learning, 300 others
2. Analysis and specify architectural requirements: 24 in 3 groups:
3. Establish the MOA reference architecture. Client (fairly thin) and server. Authorship module is part of the server. Also content management.

Incorporates 83% of the total. Example was "battleships".

# Chapter 7

## Section F2D: Ethics

### 7.1 An Ethics Curriculum for CS with Flexibility and Continuity

Catherine Crockett and Lori Carter (Point Loma Nazarene University, USA) Asked middle-school girls about the impact of AI cashierless stores. “Could it be hacked”. “My mom could lose her job”. ACM/IEEE have suggested ethics in the curriculum. So how do we do this in a small department? We sent our students to Philosophy, but that didn’t connect.

So create many 10–20 minute ethics modules to be integrated. 1990s there was a team of 25 ethicists/CS: great, but very hard to implement. Harvard tried assigning a Philosophy TA to each CS class, but hard to sustain: TA’s scared of technology, and hard to motivate.

Students were asked to circle, then discuss, values decisions and career choices. Also first year discusses plagiarism/cheating.

### 7.2 Training Writing Tutors to Improve Their Support for Engineering Students’ Technical Reports

Ruth (writing tutor, Penn State Behrend) and Robert (ex-Penn Engineering). Robert wants his students to write well (not easy!). I sent them to writing tutors, but this didn’t help. Ruth: most of my tutors spend most of their time on composition classes: questions like “why is this graph here”.

See IEEE Trans. Professional Communication 2(2018).

**Q** I sthe cohort mostly English.

**A** Engineering is mostly native.

### 7.3 Interdisciplinary Agile Teaching

Wellington is “silicon harbour” — 25% of the NZ IT sector. NC Government decided to fund 3 “ICT Graduate schools”. These are conversion masters: 12-month program including 3-month internship. Cohorts of 14–32 (35 is probably a maximum). Industry-like facilities, 10-5 presence, industrial problem-setters.

“lectures can be disruptive”, so we began by not doing them. Slightly changed. Hard to get interdisciplinary teams (as you would see). Having phases of UX/BA/SD meant that we were imposing a waterfall structure, and a but of a “blame game”.

### 7.4 What Students Learn and Take Away from a Student-Centered Course on Communication and Professional Skills: Analyzing the Content of Students’ Self-Evaluations

Renate Motschnig (University of Vienna & Faculty of Computer Science, Austria).

Mandatory course for the “Service sector” speciality of MSc CS. Also at Masaryk in Brno. Aim to promote social/professional skills. Let students participate in the elaboration of the more socialised course goals. Goals and knowledge about teamwork etc., moderation/feedback skills; openness/sharing attitude/flexibility . . . Taught a 3×1.5 day blocks (external facilitators etc.): sitting in a circle, then listening it triads etc.

Good positive qualitative comments, especially active listening. 17 students, and could take up to 20.

**Q** How do you teach?

**A** I talk to them and I listen to them? So I ask “what is important, talking or listening” etc. Many react that they overcome their shyness.

### 7.5 The Effect of Preferred Leadership Role and Preferred Team Leadership Structure on Students’ Perception of Team Processes and Outcome

Behzad Beigpourian + colleagues, Purdue.

ABET requires undergraduates to work in teams. Therefore interest in team dynamics. Leadership identity is key. Cohesoin is teh erception of how team-members bond with the task.

Big gap:

**RQ1** To what extent do students with different perceptions of leadership affect

...

**RQ2**

First year students, 35% female. Used [Edm99] on psychological safety. Also other well-known scales. Did 8 1-way ANOVA. Students with balanced preferred leadership role had higher satisfaction. Students who preferred a single leadership structure felt less psychologically safe.



## Chapter 8

### Section F3D

#### 8.1 Learner model and prediction of the learners understanding degree using the neural networks

Tomohiro Hayashida, (Hiroshima University, Japan).

Aim is to grow process and prediction, where the LMS provides personalised support. Use a Recurrent Neural Network (Elman Network). Want the target score on the next quiz not to be too high (discouraged, loses motivation) or low (board, loses motivation). Tools at <https://bricklayer.org>

Q

A

#### 8.2 Using Visualization to Reduce the Cognitive Load of Threshold Concepts in Computer Programming

Building complex patterns using simpler ones as subroutines, for example. Ends up with a stack.

#### 8.3 Design Heuristics to Support Cohesion within Online Collaborative Learning Groups

Part of an iterative design of a homework platform to allow small group different time/place cooperation. But we only really saw bilaterals. Hence a second

iteration, where we gave people's names, rather than anonymous comments. This had knock-on effects (positive, JHD thinks). Profiles also helped. Different conversation style support helped in different tasks.

## 8.4 Took a MOOC. Got a Certificate. What now?

Catrina Tamara John (Hasso Plattner Institute, Germany). Most of audience had taken a MOOC, many fewer had passed, and almost none had used it! We (HPI) are trying to understand our audience. They seem keen to get certificates, but why?

**H1** used in career path

**H2** Learners who book the Qualified Certificate (6 euros) receive a better result than those who do not

**H3** Employers . . . .

Sample 4%, 3/4 Male, mostly Europe. Most popular reasons were understanding complex topics and hobbies. Next was "current job better". Slightly more women answered "can't apply this", so less elsewhere. 70% store on computer, 30% use for new job, 15% give to current HR. Booked qualifications had a completion rate of > 80% on almost all courses (Bigdata was 63%). Booking rate was around 1%, but these were 10% of the top 20%. 58% of the QC applied for a new job, and 72% of those said it helped.

MOOC certificates should probably include start/end dates, and amount of effort.

**JHD** When can people sign up for these certificates?

**A** It depends on the type of course.

## 8.5 Analysis of classifiers in a predictive model of academic success/failure

Pedro David Netto Silveira Ncleo de Informática Instituto Federal do Espírito Santo.

Education data mining. Used LR, C4.5 (J48), Naive Bayes, SVM.

**RQ1** Which classifier gives the best result when applied to LMS data?

**RQ2**

**Institutional Data** Gender, age etc.

**Trace data** #accesses, Forum,quiz scores etc.

**Data** from seven courses. Several had no trace data in some categories. JHD conjectures this was OU data, admitted it came via Kaggle.

Used Weka with 10-fold cross-validation. Institutional data alone has 40% success. Use trace data. J48 has mean 90.02%, SVM (89.62%), LR (89.07%). However, time taken depends greatly on the data set: adding institutional data costs a lot and buys very little. Note that SVM requires numbers, so categorical data need to be converted. J48 is most accurate and second fastest, but NB is good, and the fastest [looking at figure 5, it also has the best scaling].

## Chapter 9

### Section T1D

#### 9.1 A Pilot Study of Developing Introductory Course in Data Analytics and Business Intelligence

Minjhe Hu (Wellington Inst. Tech.) Thrs year ICT students. Teach, software, assess. Based on 2016 group [3]. Statistical thinking, computer thinking, integration. 8-step data analytics lifecycle [7]. Visualisation is key, especially IDV (Interactive Data Visualisation). Suggests Excel, with its PowerPivot feature (2GB max, apparently). To be Microsoft Power BI (Cloud version): back end SQL server. 100% of students agree with Data Visualisation. Currently only ICT students — expand next year.

#### 9.2 Improving integrated education of data science and information security through cross-curricular activities

Connie Justice (Purdue School of Engineering and Technology, IUPUI, USA). Data Analytics in CyberSecurity. 4 tracks in our programme. All take programming, networking, cybersecurity and data management at 200 level. 300 and 400 are all specialist: no hybrid. Want real-world projects. Used Network Data as our example. Classwork, joint homework, peer-reviewed presentation. 30 security students and 15 data students.

Afterwards, *all* students felt happy with Big Data Analytics. Students would like more cross-curricular courses.

### 9.3 Targeted Curricular Innovations in Data Science

Brandeis Marshall (Spelman College, USA). Claims 2.7M data professionals needed worldwide by 2020, but  $\exists$  2.2M worldwide currently. Engaged STEM and business faculty across two institutions. 10-day summer workshop and monthly seminars. 4-tier: Adoption, Adaption, Reinvention, Invention. We'd assumed the aim would be reinvention. Ended up with adaption.

First cohort 7W2M; mean 8 years teaching. 8/9 were happy to introduce this topic, but with support. It might have been more effective if we'd had a less broad cohort. We had a mixture including Psychology.

**Q** What's your view on this "infusing" rather than BSc(Data Science) etc.

**A** There isn't a society, there isn't a blueprint: Data Science is really the Wild Wild West. These programmes aren't being built "ground up". Also major concern over tools. Worse, the institutions we were working with have no Statistics Department.

\* Lengthy, but inconclusive debate about DS as a subject and its rôle in institutions.

**Part III**

**Saturday 20 October 2019**

# Chapter 10

## Section S1A

### 10.1 Using Computational Methods to Analyse Educational Data

Vieira/Magana/Boutin — Universidad del Norte (Colombia) and Purdue.

For every professional software developer in the world, there are nine people doing software development who do not regard themselves as professional software developer. [Guz15]

We had a paper on visual learning analytics, basically scoring the existing literature.

Back in Colombia, asked students their preferences by subject (Chemistry etc.).

Then ran an R tutorial.

# Chapter 11

## Section S2E

### 11.1 FITech University network

Seven universiies provide engineering masters in Finland SW Finland produces the same value fo technology as other non-capital regions of inland, but the shortage of engineers holds it back. Only BioTech, ICT and ?? are taught in SW Finland. Shipbuilding is a major local industry in Finland, and one ship can be > 1% of the country's exports. 6500MY into a single ship. Hence Ministry of Education encouraged FITech, Finnis Institute of Technology. 1+1 masters program: 1 year at university and 1 doing thesis at a company in SWF. Aim 200 new MEng/year in SWFinland. First full academi year 2018/19. 49% of compannies reported needs for new engineers, but 90% had no interaction with FITech,

### 11.2 Effectiveness of a mailing list for African-American Computer Scientists

Speaker from Morehouse College. Grossly under-represented: 1% of CS PhDs. Report isolation, hyperawareness; also indirect micro-agressions. The solution might be a resilient computing identity.

### 11.3 SIMROAA: Milti-Agenr Recommendation System for Recommending Accessible Learning Objects

Analysér agent: perceives the environment, input from the professor (student disabilities etc.). 15/23 professors answered, and 87% wanted such a system. Very positive user evaluations (100% said improved ...).



## 11.4 Women in CS: changing the women or changing the world

Shows the 1983 fall-off graph [Hen14]. Female students tend to be put off by stereotypes and decor. Peer support is helpful, but it's unclear whether women students get less. Claims that women tend to underestimate CS salaries, and know less about job options/routes.

I didn't really sense a clear answer to the question.

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