



PANEL: Education Analytics Hour!

VENICE
April 2023

DigitalWorld 2023 & NexComm 2023

Theme:

**Education Analytics / Enhanced
Learning**



PANEL: Education Hour!

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Paradigm change in Education and Learning

Learning Analytics

Knowledge, Ability, and Skills in Digital Era

Enhanced Learning

Psychology of Learning

Paradigm change and Metrics for Learning Evaluation



CONTRIBUTORS

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Moderator

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Panelists

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Chair Position

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Educational Technologies change how and what we learn

"We have to examine how technological artifacts augment, enable, and facilitate specific visions of education" (Blikstein & Blikstein 2021)

Assessment of learning using AI

Example: Artificial Intelligence for Assessment for Learning to Improve Learning and Teaching in 21st Century Lorenzo Dalvit l.dalvit@ru.ac.za
(<https://www.hiof.no/lusp/pil/english/research/projects/ai4afl/index.html>)

analyse students' texts and offer semantic, syntactic and sentimental feedback.

Skills and Knowledge in the digital Era

Example: Programming and digital fabrication in education

"Unveiling the Potential of Digital Fabrication in Arts and Crafts Education: A Future Workshop Approach for Technology-Enhanced Teaching." (Stigberg & Rabben 2023)



Susanne Stigberg



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How Learning Analytics can promote a deep knowledge of individual and corporate learning experience? How gaining a statistical measure of learning experience is usefull for different analysis and improvements?

- A **better and deeper understanding of learning phenomena** is a real issue **to ensure a support system** oriented to people needs and quality assurance for a learning system.
- **Learning analytics are growing from Data Viz toward Statistical Analysis** of learning experience.



Daniela Pellegrini

How AI algorithms can provide an easier reading of data in LMS platforms and how to use them?

- The most important issue is **grounding all statistics to a solid and rigorous data analysis model** to guarantee a global perspective on the learning experience.
- **Which dimensions define the learning experience?** How is possible to define the correct thresholds that separate good learners from other?
- How **tutors and institutions/companies can effectively use learning analytics** to improve their training offer and provide specific and targeted support to different people based on their learning behaviors? How can they use a predictive analysis to plan everyday support action or gain indications to methodologies effectiveness towards redesign process.



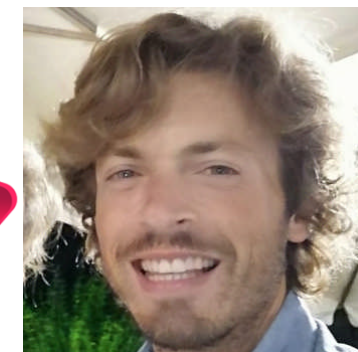
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Using Learning Analytics with Synchronous Immersive Contents to Promote Interactive Learning in 5G

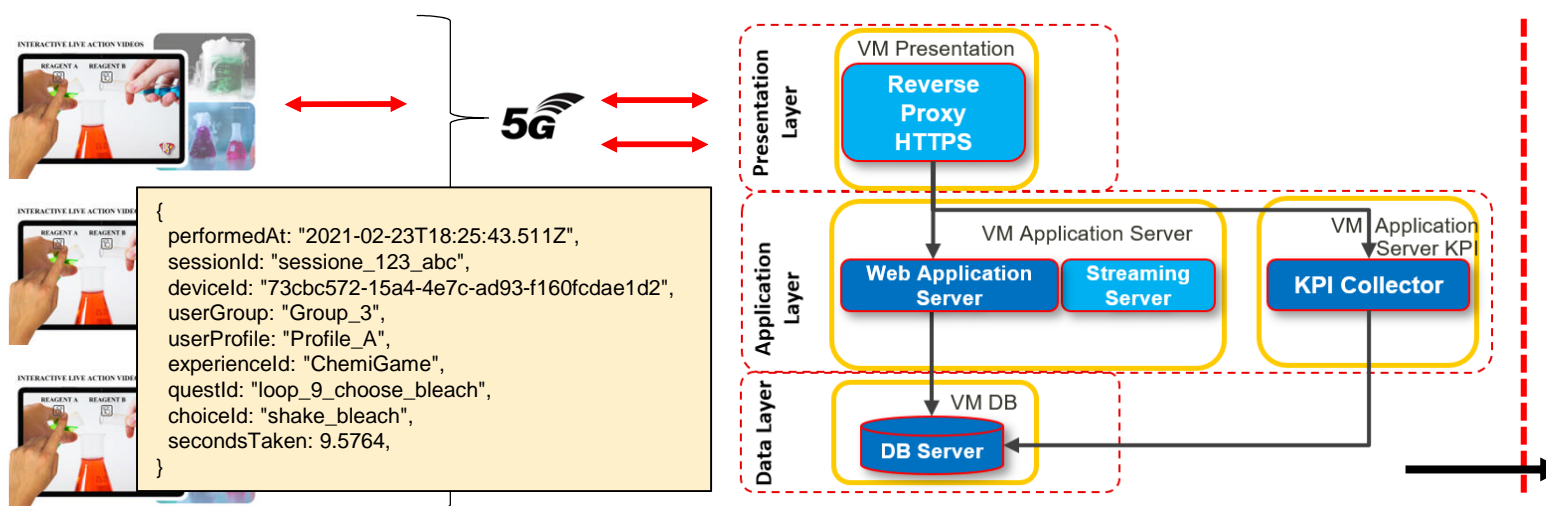
■ CONTEXT: the DI5CIS project

- Gamified interactive stories: **PhysiGame** and **ChemiGame**
- **User behavior tracker** integrated within the interactive stories



<https://www.di5cis.it>

Giannangelo Boccuzzi



KPI -> Quantitative data from logs

1. Students' Learning Performance

Attempts (number of tries used by the student for a specific question in the app), time (total amount of time spend using the app on a question), device id, use of hints (features that indicates if a student used the hints resource to answer a question)

2. Students' Engagement

Percentages of students completing easy levels, medium levels, hard levels



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Knowledge, Ability, and Skills in Digital Era

Classical Education:

memorize dates, events, and thoughts of the “great's ” without discussing and criticizing the material learned.

Example: Aristotle writes in his “*History of Animals*” :

“And the males have more teeth than the females in humans, in sheep, in goats, and in swine...”;

The British philosopher Bertrand Russell wrote:

“Aristotle maintained that women have fewer teeth than men;

although he was twice married, it never occurred to him to verify this statement. ”

Probably, the **fundamental educational problem** here is that until Middle Ages philosophy students were forced to read and memorize his works without discussing and doubting them.

Digital era education :

Hell, why didn't he just Google the question, and copy-paste the result to his work as a solid fact?

Items to discuss:

Math: we have powerful *math* software (MATLAB, MAPLE, Wolfram MATHEMATICA)

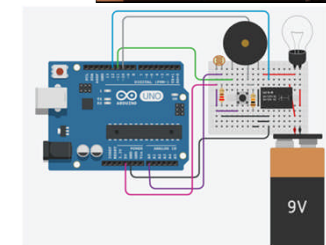
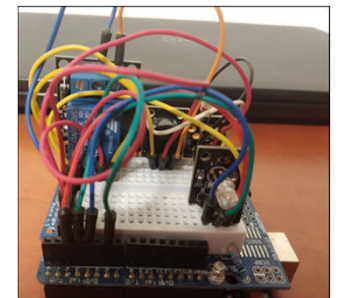
Is there a need to force students to do long manual calculations ?

Physics, Electronics, Mechanics: we have powerful simulation software (SimuLink, TinkerCad, SolidWorks)

Is there a need to sill use expensive laboratories with real “toys” – or the simulation is good enough?



Samuel Kosolapov





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Using Adaptive Courseware to Enhance Learning in Online Classes

I have been using “Adaptive” courseware for years based on student perceptions that it increases learning and test scores.

Fall ‘22 I asked students if they had used an adaptive courseware prior to my class. 80.5% responded that they had (n=171).

When asked if they liked using these platforms, over 32% said they liked using these platforms.



Martha Hubertz

Overall, would you say that you like using these adaptive and interactive platforms?

	Frequency	Percent	Valid Percent	Cumulative Percent
Like a great deal	56	29.5	32.7	32.7
Like somewhat	64	33.7	37.4	70.2
Neither like nor dislike	29	15.3	17.0	87.1
Dislike somewhat	17	8.9	9.9	97.1
Dislike a great deal	5	2.6	2.9	100.0
Total	171	90.0	100.0	



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I use courseware in most of my classes as students consistently report that they like it, they feel they learn more, and they believe they score higher on tests due to this.

I recognize that publishers consider these platforms to be “adaptive” but what does it mean to say “adaptive” when discussing courseware? I would argue that “adaptive” indicates some form of branching or responsiveness to student responses. Courseware in two of my higher-level courses. Acrobatiq is a courseware that allows for branching. Based on learning analytics from the prior semester, I took the 4 most difficult chapters for students and added branching questions called “Personal Practice” to allow students to drill down where needed.

I found that test scores improved, and students felt this was beneficial. Over 50% found it very, or extremely useful (n=180).



Martha Hubertz

Thinking about the Acrobatiq courseware for the book, how helpful did you find the Personal Practice adaptive activities?

		Frequency	Percent	Valid Percent	Cumulative Percent
d	Extremely useful	37	19.5	20.6	20.6
	Very useful	58	30.5	32.2	52.8
	Moderately useful	51	26.8	28.3	81.1
	Slightly useful	18	9.5	10.0	91.1
	Not at all useful	16	8.4	8.9	100.0
	Total	180	94.7	100.0	



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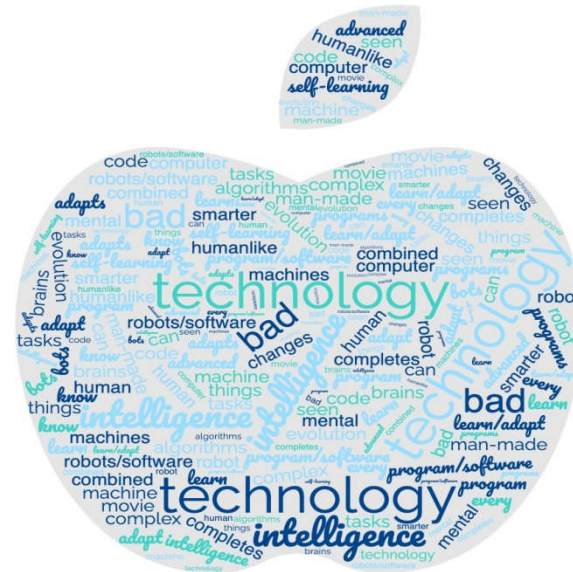
Student Knowledge, Ability, and Skills in Digital Era

Student perceptions on the role of AI in technology use and adaptive courseware in higher education is an interesting question that needs further exploration.

This is a new cohort that has been raised with technology, but this does not necessarily make them a technologically literate cohort. This is a cohort that was already using technology at a higher rate than past generations and Covid increased that relationship exponentially.

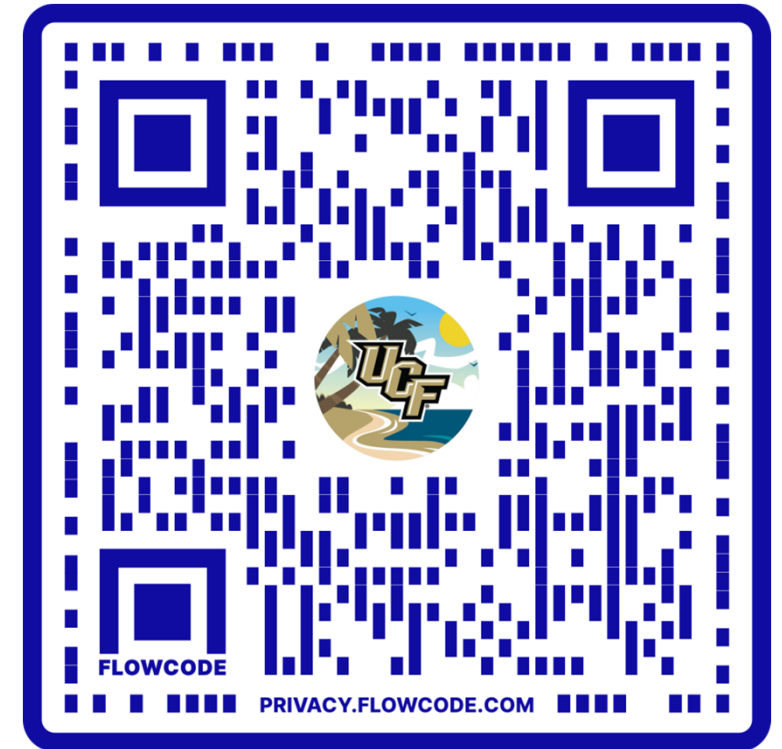
Student ideas about AI, machine learning, and courseware, could impact how they view the role of technology and AI in higher education.

Factor in AI programs like Chat GPT and the new Microsoft office AI and it starts to really get interesting.



I asked students: “Please describe below what you think artificial intelligence (AI) is”

Scan the bar code to see responses





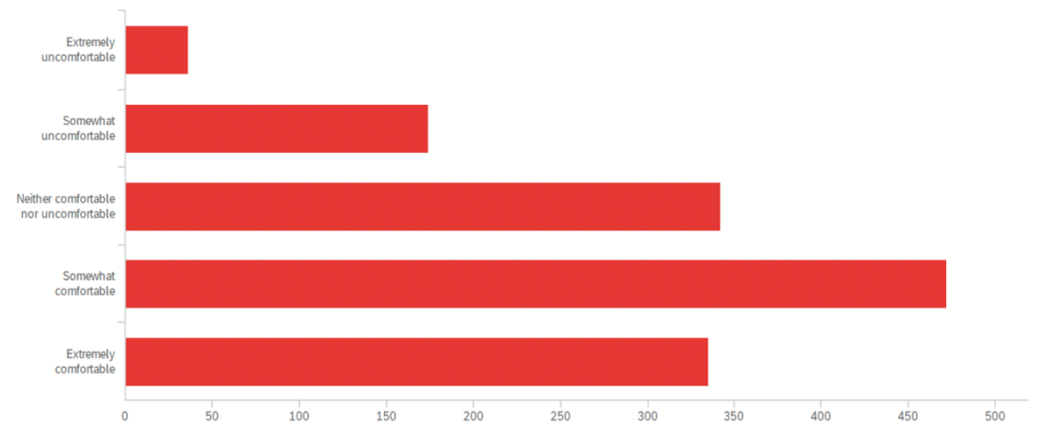
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We are interested in your attitudes towards Artificial Intelligence.

By Artificial Intelligence we mean devices or software that can perform tasks that would usually require human intelligence. Please note that these can be software, computers, robots or other hardware devices, possibly augmented with sensors or cameras, etc. Please complete the following scale, indicating your response to each item.

GAIS C18 - Generating coherent text on specific subjects.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Generating coherent text on specific subjects.	1.00	5.00	3.66	1.06	1.13	1,359

I administered the General Attitudes towards Artificial Intelligence Scale, GAAIS, (Schepman & Rodway, 202), to 1,359 undergraduate students over the ‘21-’22 academic year. When asked:
By Artificial Intelligence we mean devices or software that can perform tasks that would usually require human intelligence. Please note that these can be software, computers, robots or other hardware devices, possibly augmented with sensors or cameras, etc. How good is AI at “Generating coherent text on specific subjects.”
24.65% of students said extremely comfortable, with an additional 34.73% saying somewhat comfortable.



Martha Hubertz



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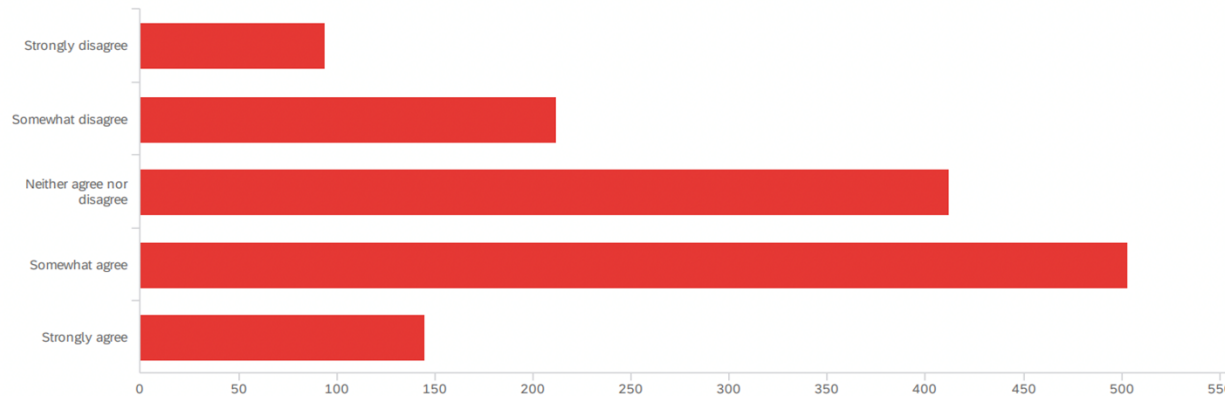
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When asked how “interested they were in using AI systems in daily life, over 47% either somewhat or strongly agreed.



Martha Hubertz

G8 - I am interested in using artificially intelligent systems in my daily life.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I am interested in using artificially intelligent systems in my daily life.	1.00	5.00	3.29	1.07	1.14	1,366

Future research in this area can focus on student perceptions of what constitutes AI vs. Computer Learning, the role of technology and AI in higher education, and students trust in technological systems.

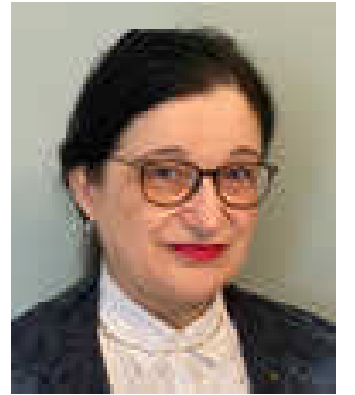


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The **paradigm change in higher education** is predominantly driven by

- Change in students' media consumption and learning behaviour
- Seemingly valuable commoditized knowledge available at a fingertip
- Shift from students' curiosity towards degree-centric learning
- Decline of the academic as a desirable role model



Monika Maria Möhring

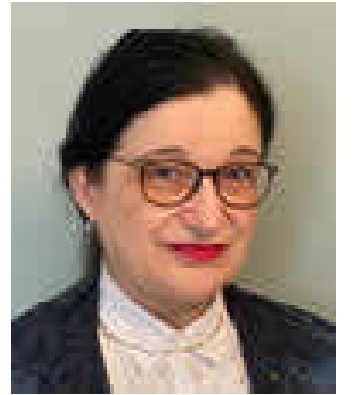


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Knowledge, abilities, and skills necessary in the digital era entail

- High media competency
- Creativity even in STEM subjects
- Self discipline and self management
- Interdisciplinary and intercultural communication competence
- Mediation and soft skills



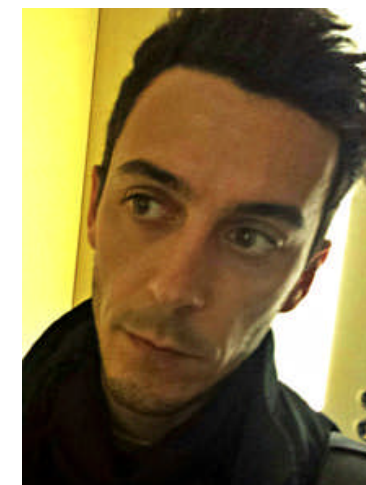


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Using Multimodal Learning Analytics for Stealth Assessment in the Playful Classroom

- Teacher's (typical) problem when using (digital) game-based learning in formal settings is **evaluating the real impact of the game experience on the students' knowledge gain**
- Typical scenario is pretest-posttest (subjective methods)
- Can approaches based on the ***non-intrusive use of in-game interactions*** and ***learning analytics*** be used to measure and/or predict students' knowledge acquisition?
 - Teacher can monitor in real time the whole game process (e.g., **Teacher's Dashboard**), providing on time (individual) feedback
- Is it possible to keep track of game actions/interactions not only in the **digital space**, but also in the **physical one** to exploit other dimensions of learning?
 - **Collaboration in co-located space** using high frequency sensors (eye-trackers, motion sensors, wearables) -- webcam recording, microphone recording, geolocation markers, ...
 - **Cognitive load** using physiological responses/measures recording such as EEG, HRV, GSR (objective methods)



Consiglio Nazionale delle Ricerche

Flavio Manganello



OPEN DISCUSSION

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Output highlights

- A serious global issue: after COVID-19, less students are willing to attend campus. Their motivation to study "hard" disciplines is steadily declining. Still, educators are trying to find creative ways to teach students at a high level.
- Education is impacted by use of AI-based technology and digital procedures for assessment of learning and assessment of skills and knowledge; feedback to students is not personalized
- Tutors and institutions/companies should effectively use learning analytics for evaluating the quality of learning
- Adaptive courseware can enhance learning in online classes; students perception of digital technologies (including AI-based) are relatively encouraging, but the level is not too high
- There is a paradigm change in higher education with respect to learning behavior (leaning to degree-centric vs knowledge-centric); there is a need for professors skills to teach in the digital era
- Immersive context promotes interactive learning (mostly via gaming)
- Multimodal learning analytics approach allows a non-intrusive use of in-game interactions where a teacher can evaluate both digital and real spaces to measure and/or predict students' knowledge acquisition¹⁶