Directions for making the most of learning analytics

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NYU
Feedback loops between students and instructors are missing or weak!
Current state

Understanding and supporting learning

Moving away from deficit models
Current state

Detecting learning strategies

Reflective of approaches to learning (deep and shallow)

Current state

Personalized feedback at scale

Systemic adoption interest

The SHEILA framework

CHALLENGES IN LEARNING ANALYTICS
Challenges

Validity – Interaction
Challenges

Validity – Interaction
Unified theory of construct validity

<table>
<thead>
<tr>
<th>Construct validity</th>
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<tbody>
<tr>
<td>Content</td>
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<tr>
<td>Structural</td>
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<td>Generalizability</td>
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Unified theory of construct validity

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Generalizability

Difficulty to replicate findings
The Open Academic Analytics Initiative (OAAI)

Early detection of at-risk students can trigger proactive support to help students get past roadblocks and stay on a path to academic success.

The OAAI offers an open-source solution that identifies at-risk students through predictive analytics. The model applies data mining techniques to a large set of student demographic and aptitude data as well as event logs and gradebook data stored in the Sakai learning management system (LMS).

Subjects:
- All subjects

Primary Contact Name:
Josh Baron
Josh.Baron@Marist.edu

Funding Framework:
Higher Education Tech Innovation

Primary Challenge Area:
Learning Analytics
Inconsistent associations of network centrality on performance
Substantive validity

Can we trust our measures?

Time on task

Challenges

Validity – Interaction
Interaction

Dashboards
Interaction

Dashboards

My course progress – Week 7 / 10

My course activities

completion of course objectives

completion of course activities

My study hours

Your cohort average (minutes)

Total time spent by you (minutes)

Your cohort

you

My study hours (average)

Your hours

Your cohort hours (average)
Interaction

Dashboards can be harmful
Interaction

Dashboards can be harmful

Can lower motivation

Dashboards can be harmful

Can lower GPA

Interaction

Dashboards can be harmful

Offer no guidance and evoke negative emotions

DIRECTION
Learning analytics are about learning

Field of research and practice

Challenges

Validity – Interaction
Generalizability

Instructional conditions shape learning analytics results

External validity

Network centrality with weak ties creates advantage only

Substantive validity

self-report measures
Substantive validity

Traced self-report measures
Substantive validity

Traced self-report measures

Cognitive load and self-efficacy
Substantive validity

Quid pro quo

Substantive validity

Quid pro quo

Substantive validity


Quid pro quo
Challenges

Validity – Interaction
Interaction

Theory-informed design

Promote activation of learning mechanisms
Grounded in the literature about learning

Starburst

Interaction

Why it must be a diagram?

Theory of cognitive fit
Theory of technology-task fit
Providing personalised, timely support actions to large student cohorts.

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Analytics-based feedback

**Instructor**

**Task 35**

**Q1**
You should take a more careful look at how symbols are encoded in the video. Would you be able to encode/decode UAL symbols without looking at the video?

**Q2**
Good initial work. However, did you understand the trick to handle encoding with a variable number of bits? Would you be able to provide an example?

**Q3**
Good work. Would you be able to come up with your own machine language and your encoding scheme? Remember that it has to be unambiguous.

**Q4**
Thorough work with the task about machine language encoding. Give it a quick review before the midterm.

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Analytics-based feedback

Hi {name}

Here are some comments about the tasks this week

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<th>Task 1</th>
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<th>Task 3</th>
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<tbody>
<tr>
<td>Q1</td>
<td>Q3</td>
<td>Q2</td>
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Regards

Hi

Here are some comments and feedback about your lecture preparation in ELEC1601 during Week 2.

Activity VIDEO: Encoding in base 2, 8 and 16

- Make sure you review again the whole content explained in the video of the activity. You could use a piece of paper and try to replicate the developments that are explained in the video.
- Give another round to the questions next to the video in this activity until you answer all of them correctly at the first attempt and without looking at the solutions.

VIDEO: Review of natural and integer number encoding

- Make sure you review again the whole content explained in the video in the activity. Encoding naturals is a procedure that you will be using very frequently in the following weeks.

VIDEO: Encoding Integers

- Review again the 2s complement encoding explained in the video in the activity. Repeat the procedure until you are able to do it very fast.
- You should give it another try to the questions next to the video in this activity. Try to work in the encoding until you have no incorrect answers in a full round.

Read about the floating point representation

- Good work with the questions in the section. You may take some of them and create variations (change number of bits for example) to make sure you fully understand the concepts.
- You should give it another try to the questions about range, accuracy and precision in section 2.7.2.
- Good work with the questions in section 2.7.3.

Sequence of problems about information encoding

- Good work with the exercises in the sequence. You may want to review it in a few days, or perhaps before the midterm.

Regards

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Analytics-based feedback

Analytics-based feedback

[Bar chart showing the percentage of students engaging in different learning strategy modes over the years 2014, 2015, and 2016.]

Moving from preconceived decisions to designs that fit tasks
MULAS
Model of user-centered learning analytics systems

FINAL REMARKS
Making the most of learning analytics

Learning analytics is more than data science
Making the most of learning analytics

Theory and design are critical dimensions of learning analytics
Making the most of learning analytics

Analytics need to focus on understanding and optimizing learning
Directions for making the most of learning analytics

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