Assessment: The silent killer of learning

College of Science Distinguished Speaker Series
Rochester Institute of Technology
Rochester, NY, 17 October 2016
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kosten
1. die Kosten (pl.)
2. kostbar

krank
1. die Krankheit, —(e)s, —en

cow

das Kind, —(e)s, —en
1. kind-(e)s, —en

kennen
1. kennen-gekannt
2. kennen-lernen
3. kennen
4. kennen

magnificent
1. magnificient

think

glor

drad

430

der Kellner, —s, —
1. der Keller, —s, —

455
35% retained after 1 week
we only guarantee they’ll pass the test
assessment focussed on ranking and classifying, not on developing 21st century skills
purposes
purposes

problems
1. purposes
2. problems
3. improvements
how many different purposes of assessment can you think of?
1. rate students
2. rate professor and course
3. motivate students to keep up with work
4. provide feedback on learning to students
5. provide feedback to instructor
6. provide instructional accountability
7. improve teaching and learning
purposes
problems
inauthentic tests

1 purposes
2 problems
what is the meaning/definition of...?
inauthentic problem solving
purposes

problems
1 purposes
2 problems

problem
outcome

EDUCACION
1 purposes
2 problems
1 purposes

2 problems
1 purposes 2 problems
1 purposes

2 problems
1 purposes
2 problems

Thinking skills

- REMEMBERING
- UNDERSTANDING
- APPLYING
- ANALYZING
- EVALUATING
- CREATING
On a Saturday afternoon, you pull into a parking lot with un-metered spaces near a shopping area. You circle around, but there are no empty spots. You decide to wait at one end of the lot, where you can see (and command) about 20 spaces.
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How long do you have to wait before someone frees up a space?
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How long do you have to wait before someone frees up a space?

Requires:
- Assumptions
- Developing a model
- Applying that model
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Assumptions
Developing a model
Applying that model
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**Assuming people leave at regularly-spaced intervals**, how long do you have to wait before someone frees up a space?

**Requires:**
- Assumptions
- Developing a model
- Applying that model
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**Requires:**

- Assumptions
- Developing a model
- Applying that model
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\[ t_{\text{wait}} = \frac{T_{\text{shop}}}{N_{\text{spaces}}} \]
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How long do you have to wait before someone frees up a space?

\[ t_{\text{wait}} = \frac{T_{\text{shop}}}{N_{\text{spaces}}} \]
computers can do this!

1 purposes
2 problems
purposes

problems
REAL problem solving

1 purposes

2 problems
grading incompatible with real problem solving
1 purposes

2 problems
isolation
4. We will use spherical coordinates:

\[ 0 \leq \phi \leq \frac{\pi}{4}, \quad 0 \leq \theta \leq 2\pi, \quad -\pi \leq \varphi \leq \pi \]

Integral is thus:

\[
\int_0^{2\pi} \int_{-\pi}^{\pi} \int_0^{\frac{\pi}{4}} \rho^2 \sin \phi \, d\rho \, d\varphi \, d\theta
\]

\[
= \left\{ \left\{ \frac{\rho^3}{3} \right\} \right\} \left\{ \frac{\pi}{4} \right\} \left\{ \frac{\pi}{2} \right\} \sin (2\varphi) \, d\varphi
\]

\[
= 0
\]
high-stakes examinations promote cramming

1 purposes
2 problems
information stored in short-term memory
information stored in short-term memory

no retention
no transfer
assessment produces a conflict
assessment produces a conflict

do coach or judge?
conflict resolved by:

objectivity (fairness, reliability)

1. purposes
2. problems
List the three important concepts that the Law of conservation of Energy leads to:

- Equilibrium (boiling)
- Thermodynamics (boiling)
- Kinetics (boom-chicka-wow-wow)

… but …
1. purposes
2. problems
only lowest order thinking skills can be judged objectively

1. purposes
2. problems
and then there is...

- grade inflation
- cheating

1 purposes
2 problems
1 purposes  2 problems  3 improvements
1. mimic real life
open-book exam

1. purposes
2. problems
3. improvements
1 purposes
2 problems
3 improvements
purposes
problems
improvements
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1. **purposes**
2. **problems**
3. **improvements**
Session 389314

This is the individual round; work on these questions on your own.

expression question

What is the derivative of \( f(x) = 3x^2 - 6x \)?

Enter an expression, e.g., \( x^2 \) for \( x^2 \), \( \ln(y) - \sin(x) \) for \( \ln y - \sin x \), \( x/(y+1) \) for \( \frac{x}{y+1} \), \( (1/2)x \) for \( \frac{1}{2} x \). Do not enter a complete equality.

Current team: Blue team  🫖 Change team  ✿ Change seat  ✔️ Send a message to the instructor  ❌ Join another
This is the individual round;

**expression question**

What is the derivative of $f(x) = 3x^2 - 6x$?

Enter an expression, e.g., $x^2$ for $x^2$, $\ln(y)-\sin(x)$ for $\ln y - \sin x$. 
This is the individual round;

**expression question**

What is the derivative of $f(x) = 3x^2 - 6x$?

Enter an expression, e.g., $x^2$ for $x^2$, $\ln(y)-\sin(x)$ for $\ln y - \sin x$.
What is the derivative of $f(x) = 3x^2 - 6x$?

Enter an expression, e.g., $x^2$ for $x^2$, $\ln(y) - \sin(x)$ for $\ln y - \sin x$. 
2 focus on feedback, not ranking
objective ranking: a myth
2 metrics, 2 results

![Graph showing relationship between conceptual understanding and final grade.](image)
Aristotelian thinkers

1 purposes
2 problems
3 improvements
top performers, broad grade distribution
objectivity or injustice?

![Graph showing final grade vs. conceptual understanding]

1. purposes
2. problems
3. improvements
focus on skills, not content
Grant Wiggins and Jay McTighe, *Understanding by Design* (Prentice Hall, 2001)
Traditional approach to course planning

1 purposes
2 problems
3 improvements

course content
Traditional approach to course planning

1. purposes
2. problems
3. improvements

- course content
- assessment
Traditional approach to course planning

course determined by content

1 purposes
2 problems
3 improvements
Backward design

1. purposes
2. problems
3. improvements

desired outcomes
Backward design

1. purposes
2. problems
3. improvements

acceptable evidence → desired outcomes
Backward design

1. purposes
2. problems
3. improvements

- instructional approach
- acceptable evidence
- desired outcomes
Backward design

1 purposes
2 problems
3 improvements

course defined by outcomes

instructional approach
acceptable evidence
desired outcomes
Backward design

1. purposes
2. problems
3. improvements

course defined by outcomes

instructional approach

acceptable evidence

desired outcomes
resolve coach/judge conflict
1. purposes
2. problems
3. improvements

use external evaluators
peer- and self-assessment

1. purposes
2. problems
3. improvements
Calibrated Peer Review

cpr.molsci.ucla.edu

1. purposes
2. problems
3. improvements
rethink assessment
For a copy of these slides:

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