Expanding Notions of Literacy

Big Data Comes To School: Implications for Learning, Assessment, and Research

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Thesis:

There will, in the future,
be no difference between
instruction and assessment

How?

Big Data

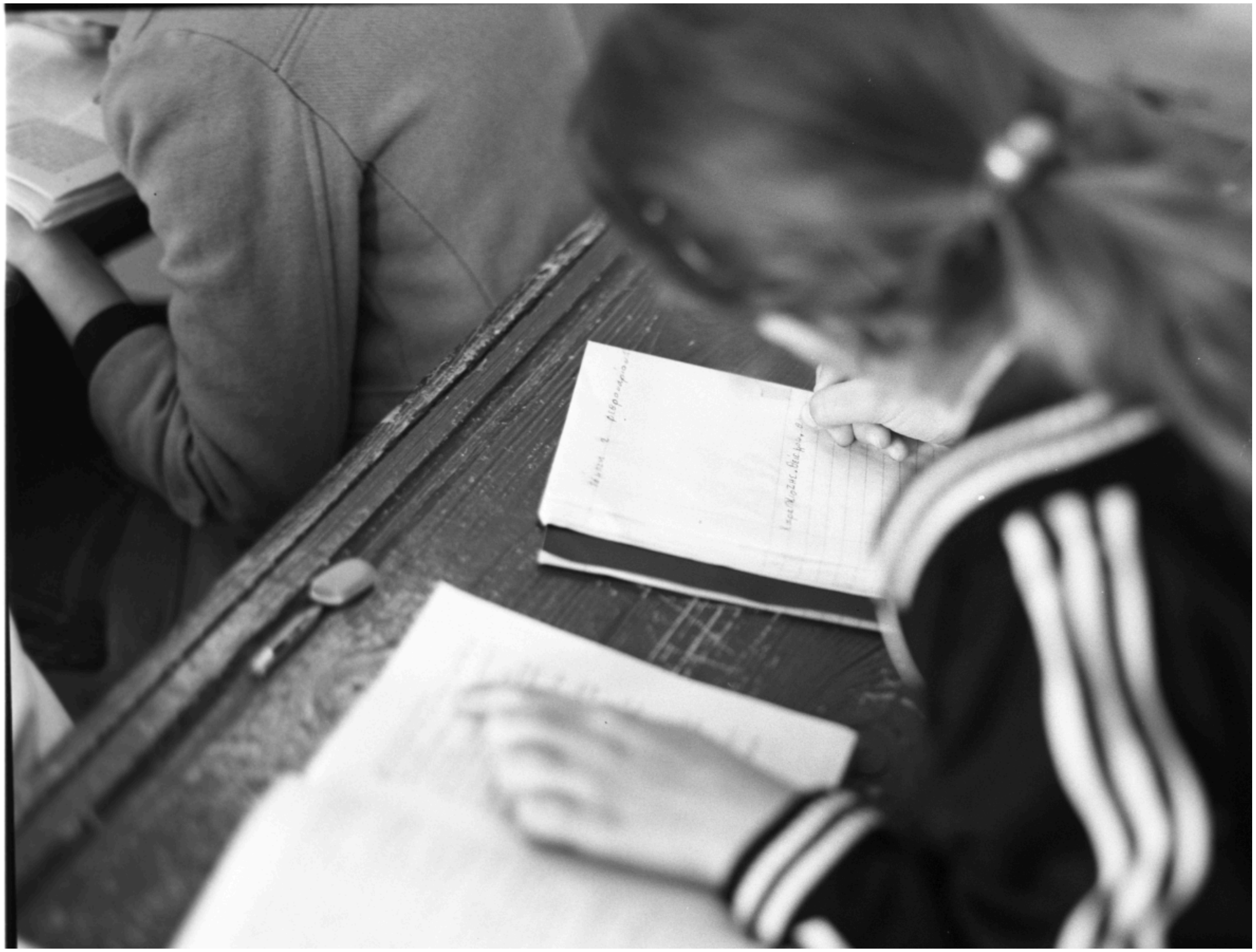
Learning Analytics

The Old School

Here we are at school. All is well, the students are busily at work …

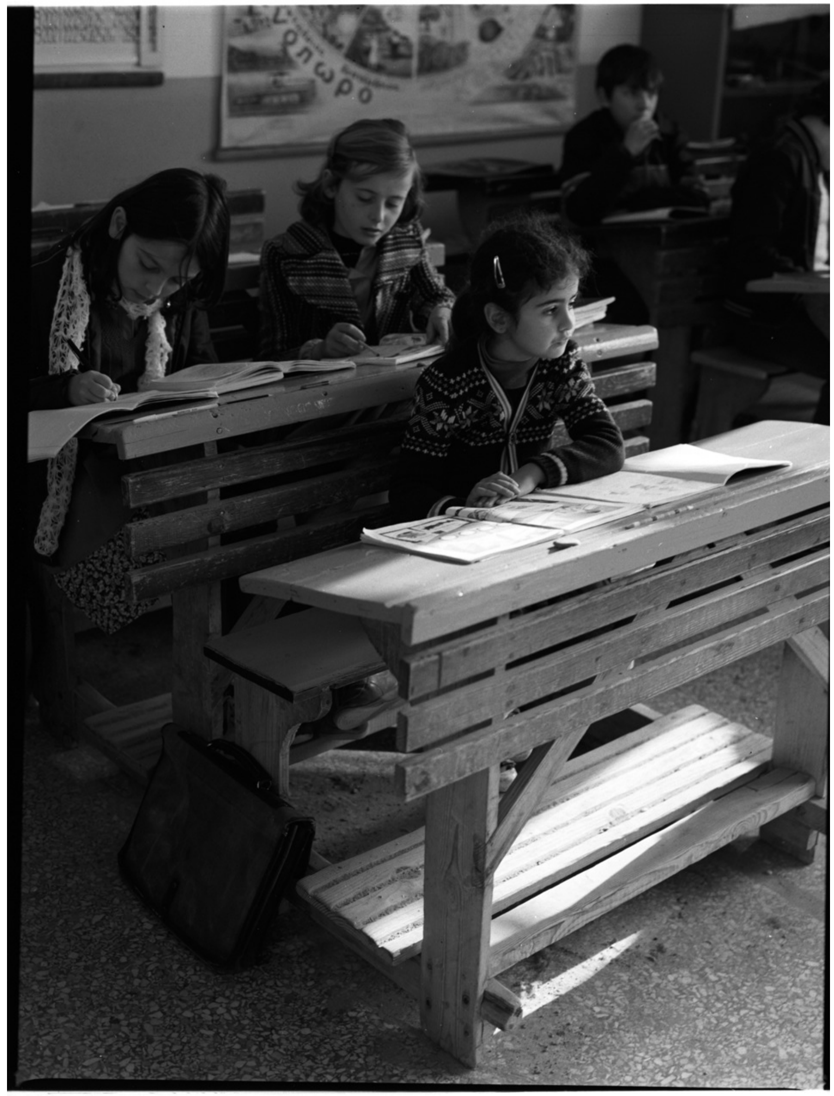
'Look this way', the teacher says.
'Listen to what I tell you about … . Answer my questions, hands up, only one person may speak at a time.'

‘Now, everyone read chapter 7—carefully, and silence, please …’



'… and now, answer the questions at the end of the chapter. No talking.'

Soula looks up for a moment. Is she thinking about her work? Or is she daydreaming?



Then, something terrible happens …

‘Turn around, Soula,’ says the teacher. ‘Don’t disturb the girls behind you.’


User Name student
Password kids
Log On To RCS
Entire Network
RCS
Kedesh
Classes
Grades 1-8
Users
Find Folder
Ctrl-A - SELECT ALL
Ctrl-C - COPY
Ctrl-V - PASTE
Ctrl-S - SAVE
Ctrl-P - PRINT
Ctrl-Z - UNDO
Ctrl-X - DELETE
KNOW Your Keyboard
MISSION STATEMENT
Peter
Paul
Noah
Moses
Luke
Lydia
Martha
Eve
Mary
Hannah
Esther
Adam

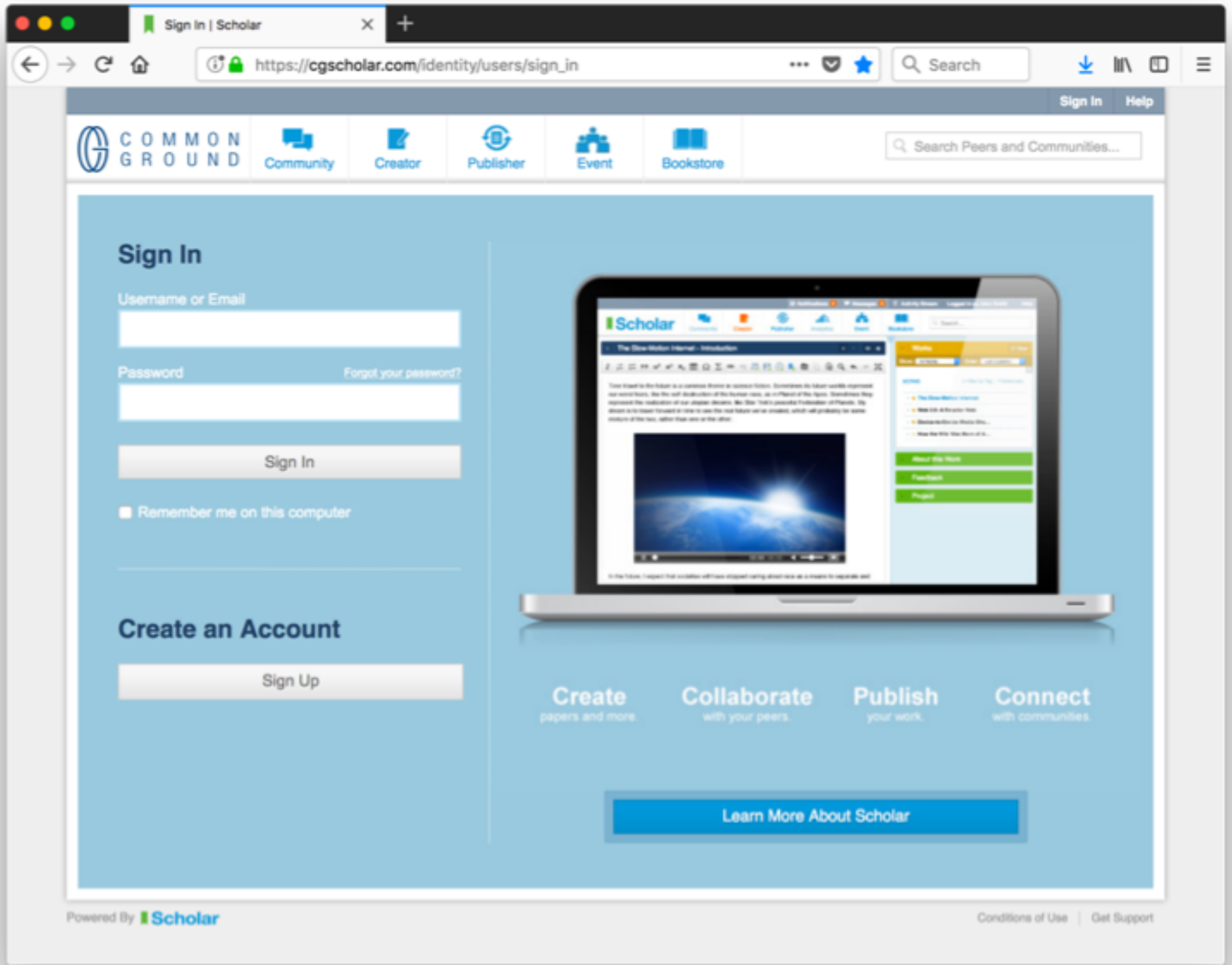
Epistemological and Pedagogical Presuppositions

Learning is individual memory work

or

achieving correct results using memorized procedures

The New School



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Some cases …

Some Changes

Knowledge is social

Crowdsourcing assessment

Shifting the main locus and logic of assessment from summative to formative

From linear to recursive feedback

Summative assessment takes the form of progress visualizations

Definition

'Big data' in education are:

1. the *purposeful or incidental recording* of activity and interactions in digitally-mediated, network-interconnected learning environments—the volume of which is unprecedented in large part because the datapoints are smaller and the recording is continuous;

2. the *varied types of data* that are recordable and analyzable;

3. the *accessibility and durability* of these data, with potentials to be: a) immediately available for formative assessment or adaptive instructional recalibration, and b) persistent for the purposes of developing learner profiles and longitudinal analyses; and

4. presentations of *data analytics*—syntheses based on the particular characteristics of these data, for learner and teacher feedback, institutional accountability, educational software design, learning resource development, and educational research.

Data Typology

Data Type	*Mode of Data Collection*	*Practices: Examples*
1. Machine Assessments		
	a. Computer adaptive testing	Select response assessments, quizzes (e.g. reading comprehension, grammar, vocabulary)
	b. Natural language processing	Automated essay scoring, feedback on language features
2. Structured, embedded data		
	a. Procedure-defined processes	Games, intelligent tutors
	b. Argument-defined processes	Rubric-based peer review of writing
	c. Machine learning processes	Semantic tagging and annotation, text visualizations, accepted textual change suggestions
3. Unstructured, incidental data		
	a. Incidental 'data exhaust'	Keystroke patterns, edit histories, clickstream and navigation paths, social interaction patterns
	b. Dedicated devices for collecting unstructured data	Video capture, eye trackers, movement detectors

Assessments

Traditional Assessment Model	*Emerging Assessment Model*
• Assessment is *external* to learning processes; the challenge of 'validity' or alignment of the test with what has been taught	• Assessment is *embedded* in learning; 'validity' no longer a challenge
• Limited opportunities for assessment, *restricted datasets* (select and supply response assessments)	• Data is big because there are so can be *many small datapoints* during the learning process (structured and unstructured data)
• Conventional focus on *summative assessment*	• Renewed focus on *formative assessment*
• Summative assessment is an outcomes or *end view* of learning	• Summative assessment is a progress view, using data that was at first formative to trace learning progressions; feedback is *recursive*
• *Expert* or teacher assessors	• *Crowdsourced*, moderated assessments from multiple perspectives, including peers and self
• Focus *on individual memory* and deductions leading to correct or incorrect answers	• Focus on knowledge representations and *artifacts* that acknowledge textual provenance and trace peer *collaborations*
• Assessment of *fact and correct application*	• Assessment of *complex epistemic performance*, disciplinary practice
• Assessment experts as *report grades*	• Learners and teachers as data analysts, with the support of *analytics dashboards and visualizations*

Research

Traditional Research Model	*Emerging Research Model*
Researcher as *independent observer*	Researchers recruit subjects as data-collectors, *co-researchers*
Optimal, *sample 'n'* to produce reliable results	There is no marginal cost for *n = all*, and data is rich enough to support *n = 1*
Practical limits to research perspective determined by the *scale of data collection*	*Multiscalar perspectives,* from n = 1 to n = all
Fixed timeframes, long enough to demonstrate overall effect; longitudinal analyses expensive and thus infrequent	*Short timeframes,* feeding small incremental changes back into the learning environment; *longitudinal timeframes* as a consequence of data persistence
Standardization effects (fidelity, average effect)	Tracing *heterogeneity* in data, e.g. different paths in adaptive learning environments, salient activities of outliers
Causal effects: *overall,* for whole populations or population subsets	*Microgenetic* casual analysis, e.g. learning progressions for different students, differential effects traceable in varied learning paths
Relatively *separate quantitative and qualitative* research practices; *low significance of theory* in empirical analyses	*Integration of quantitative and qualitative* analyses; *increasing importance of theory* in data analyses

The Test is Dead

Long Live Assessment!

Reference

AERA Open
April-June 2016, Vol. 2, No. 2, pp. 1–19
DOI: 10.1177/2332858416641907

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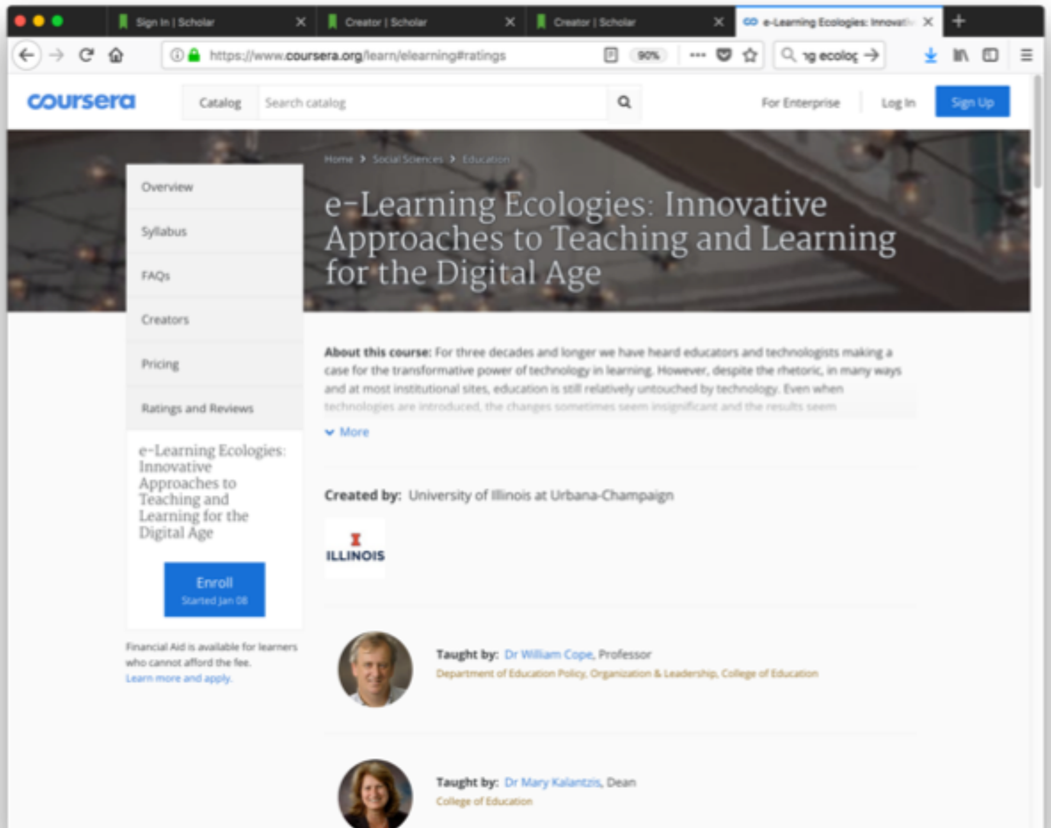
The prospect of "big data" at once evokes optimistic views of an information-rich future and concerns about surveillance that adversely impacts our personal and private lives. This overview article explores the implications of big data in education, focusing by way of example on data generated by student writing. We have chosen writing because it presents particular complexities, highlighting the range of processes for collecting and interpreting evidence of learning in the era of computer-mediated instruction and assessment as well as the challenges. Writing is significant not only because it is central to the core subject area of literacy; it is also an ideal medium for the representation of deep disciplinary knowledge across a number of subject areas. After defining what big data entails in education, we map emerging sources of evidence of learning that separately and together have the potential to generate unprecedented amounts of data: machine assessments, structured data embedded in learning, and unstructured data collected incidental to learning activity. Our case is that these emerging sources

References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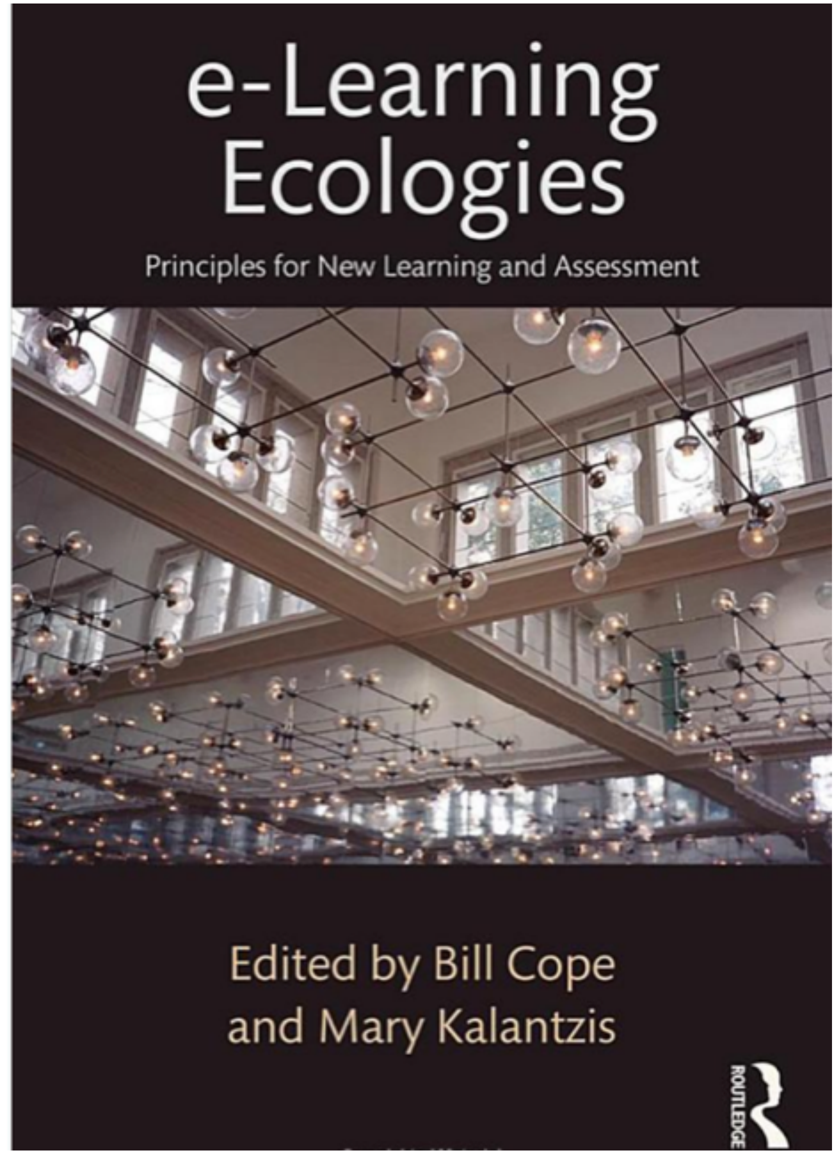
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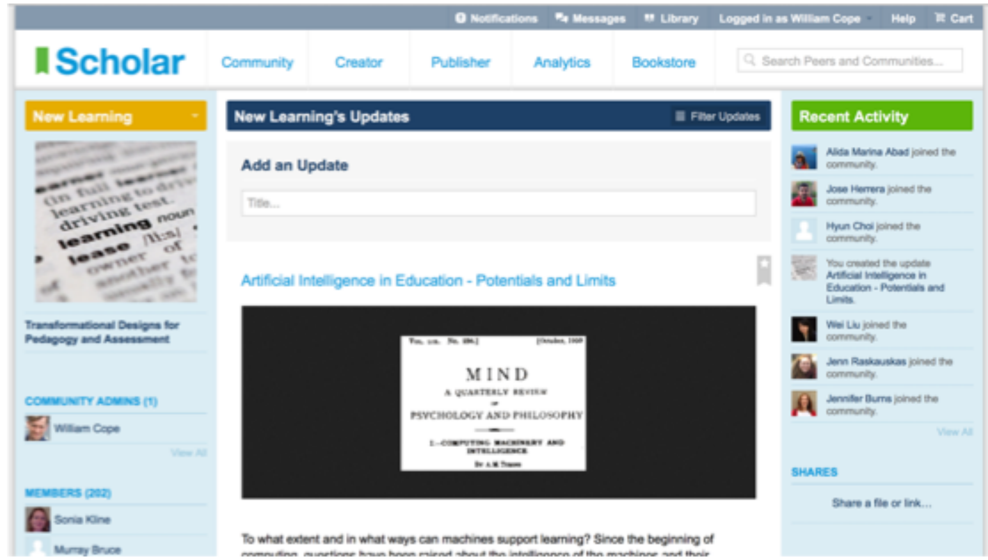

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