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## New Media and Productive Diversity in Learning

### 1. Introduction

Schools first took their classical modern form in the era of mass media. They align with the socio-cultural logic of these media. In fact, as communications architectures, they are themselves instances of early modern media. Both classical modern schools and the mass media presuppose a relative sameness among their audiences and students. We call the underlying pedagogical and epistemic forms of classical modern schools “didactic/mimetic”.

We propose an alternative to classical modern schooling that we call, by contrast, “reflexive/inclusive”. The pedagogical and epistemic forms that underlie reflexive/inclusive education are not new. In fact, the critique of didactic/mimetic pedagogy is as old as modernity itself. However, new media make a reflexive/inclusive pedagogy more practicable. Reflexive/inclusive pedagogy also aligns with the spirit of new media and the sensibilities of today’s learners. Both new media and new learning replace a regime of imposed sameness with socio-cultural systems that require the negotiation of diversity.

Not that this is a simple story of progress, from the old media and learning, to the new. Rather, it is a story of the displacement of one set of challenges, partial successes and persistent failures, with a new set of challenges, equally promising and disappointing but completely different. It is also a story of uneven development, where the old regime and the new are in tension with each other as competing visions of humanity—for instance, when the “back to basics” people argue with educational progressives, or when educational technologies revive and fossilize didactic/mimetic pedagogies.

In this paper, we reframe ideas that we have articulated at greater length elsewhere, moving them forward to the extent that here we link questions of new media to learner diversity. To make our case, we cross between theoretical reflection and practical examples drawn from our *Scholar* intervention—an experimental new media space where we have been exploring the practicalities of a reflexive/inclusive pedagogy.

### 2. Old Media and New

Theorist of modern nationalism, Benedict Anderson, speaks of the newspaper as a symptomatic cultural ritual: “The significance of this mass ceremony—Hegel observed that newspapers serve modern man as a substitute for morning prayers—is paradoxical. It is performed in silent privacy ... Yet each communicant is well aware that the ceremony he performs is being replicated simultaneously by thousands (or

millions) of others of whose existence he is confident, yet of whose identity he does not have the slightest notion.” The effect, Anderson says, is to create an “imagined community because, regardless of the actual inequality and exploitation that may prevail in each, the nation is always conceived as deep, horizontal comradeship. An American will never meet, or even know the names of more than a handful of his ... fellow Americans. He has no idea of what they are up to at any one time. But he has complete confidence in their steady, anonymous, simultaneous activity...Ultimately it is this fraternity that makes it possible, over the past two centuries, for so many millions of people.”(Anderson, 1991, pp. 35, 7, 26) Something similar might be said of syllabi and textbooks as media, speaking to salutary historical narratives, or standard forms of the language of the state, or the universal functional requirements of numeracy. Schools are in fact a key agency in the social construction of the putatively homogenous nation state.

Here are the characteristic technological and communicative features of mass media. They are based on economies of scale where larger print runs make more sense for newspapers and books, and where later, the broadcast media of radio and television concentrate the means of production of communicated meaning in the hands of companies or the state who can afford to invest in expensive infrastructure and professional journalists. In a big city, there may have been at most several newspapers, and a handful of television channels and radio stations. The institutional outcome is the “mass media” (cp. Adorno, 1957; McLuhan, 1964 (2001); Williams, 1989). The spoken-to many listen quiescently to the speaking few. The cultural effect is to anticipate and promote cultural and linguistic conformity—“mass culture” and the ideologies of nationalism. Institutionalized mass schooling creates parallel social and cultural effects.

Then, with digitization and the internet, there arise new media (cp. Kalantzis & Cope, 2015). The transformation is radical. The several newspapers available locally are replaced by any and every newspaper in the world, by millions of blogs, and by aggregators and feeds which remix stories according to their, or your own, ideological proclivities. The supposedly neutral view of the journalist presenting an acceptable range of perspectives is replaced by a shrill cacophony of ideological voices. Amateurs speak freely to any topic.

In the social media—Facebook, Twitter, Instagram—anyone who happens to be on the spot at a moment of newsworthy significance, can post a shock-inspiring video or a reveal a leaked document. The news could be a meal, a sight, a funny moment, newsworthy only to an audience as narrow as one’s circle of friends or followers. There are no economies of scale. There are no hierarchies of speech-privilege. In these new media, there are fewer professional communicators: journalists, radio presenters, television hosts and the like. Everyone is a media person now. Reading and writing, making and consuming media, happen in the same space, dialogically where the two activities are inseparable, as practices and as social roles. This represents a phenomenon we call a shift in the balance of agency, from the society of homogenizing mass culture, to a media infrastructure which offers new cultural and communicative powers to people now positioned as “users”, rather than the quies-

cent audiences or readers of the past. And with the grant of communicative agency, a panoply of diverse voices can now be heard. Against the homogenizing tendencies of an earlier modernity, a thousand differences can now flourish, becoming all-the-more poignant for their juxtaposition.

Of course, this is not to be under any illusion that these new media are unequivocally a good thing. For their awakening of communicative agency, they may also foster narcissistic identities that crave the attention of “followers” with their “selfies” and attention-grabbing tweets. Their contents may often be trivial and distracting, filling users’ time with a junk culture of animal videos and funny little accidents. The notifications, the insistent advertisements, and the overwhelming feed flows, it can be argued create attentional deficits that distract from sustained and critical thinking. Might these new media be considered today’s “opium of the masses”? And although apparently “free” in the double sense of no cost and freedom expression, these spaces are dominated by new media behemoths, far larger, far more expansive, and far more profitable than the old mass media ever were. Unlike the journalists or media producers of old, nobody gets paid for the cultural and knowledge work that they do. The only people making money are the owners of the giant server farms and their workers, these advertising agencies of the twenty-first century.

Whether we celebrate or lament these new media, they are undoubtedly fundamentally different from the old, mass media. Importantly for our argument here, these new media produce the opposite effect from the homogenizing mass media of earlier modernity. They nurture a thousand divergent identities, spaces for the distinctive of expression of the finely nuanced politics, age, gender, culture ... the list of identity categories is long. As a consequence, our human differences are becoming more marked. We are today as different from each other as the circles within circles of our Facebook friends, our Twitter followers, our shared Spotify play lists, or our documented habits, reputations and commentaries as Amazon or e-Bay purchasers or sellers.

### 3. Educational Media of Sameness

Schools can be conceived as media. A peculiar and remarkable thing about schools is their range of possibility for “exophoric reference”. There is nothing of the world that cannot be brought into the classroom via education’s peculiar pedagogical media—classically the syllabus, the textbook, and the teacher’s lecture. Into the empty classroom of the modern school, with its as-yet unknowing students, the stuff of the world can be brought in via these media—the geology of volcanoes, or the scanning schemes of eighteenth century poetry, or Leibnitz’s and Newton’s calculus. There is nothing at all of the world to which educational media cannot speak, and have not spoken.

The media of syllabus, textbook and lecture are as new and as old as modernity. The theory and practice of the lecturing master and the listening student was articu-

lated by St Benedict and institutionalized in Western Monasticism, progenitor of the university (St Benedict, c.530 (1949). The modern textbook is as old as professor and author Petrus Ramus, an artifact created in the century after the invention of letterpress print (cp. Ong, 1958). Teacher lectures and textbooks become universal media experiences with the rise of mass-compulsory education in the nineteenth century (cp. Kalantzis & Cope, 2012).

These media establish an epistemic regime of sameness. The syllabus is the invisible administrative hand that guides curriculum—things that must be communicated, culture and knowledge that must be learned. The teacher is a knowledgeable person who can repeat what they know in a lecture, in their definitively authoritative voice. The textbook summarizes the world in an authorial monologue. The discursive modes of these communicative media is transmissive rather than dialogical, so aligning with the logic of an era of mass media. These educational media order the to-be-known world, from the simpler to the more complex. They speak synoptically so that what is said is just enough to build a mental scheme and move on to the next step. They speak univocally in the authoritative voice of the teacher or textbook author (hence “didactic”). Their effectiveness is measured in tests as evidence in the form of long term memory (hence “mimesis”). And more than merely a matter of the pragmatics of modern one-to-many communication—syllabus to an administrative unit, textbooks to a wide readership, teacher to a classroom of students—these media also have a cultural and political logic, to create uniform “imagined community” in the era of the nation-state, and disciplined citizens and workers in the era of industrial mass society (cp. Graff, 1987).

But don't be deceived by digital media, because as often as not, they reproduce these didactic/mimetic and thus homogenizing modes. The “flipped classroom” reproduces the lecture form, without fundamentally transforming it. The “e-textbook” does not change in any significant ways the discourse of print textbooks—projecting the monological, authoritative, synoptic voice of the textbook writer. Learning management systems take syllabi online, with their relentless, week-by-week unfolding of pre-digested content to be absorbed by learners. Computer adaptive tests still determine what is worthy of remembering (cp. Cope and Kalantzis, 2015). Digital media do not necessarily change anything fundamental in schools. However, what needs to be changed has been recognized since a time before digital media. New educational media may make longstanding “progressive” aspirations more practicable. Today's new media milieu may turn practicability into necessity.



## 4. Institutionalizing Sameness

Modern schools have always and inevitably encountered empirical differences. Here is a typology of learner differences that we have developed at greater length elsewhere (cp. Kalantzis & Cope, 2016, in Press):

### **Material**

*Class:* social resource access, employment and social status

*Locale:* neighborhoods and regions with differential social resources

*Family:* relationships of domesticity and cohabitation

### **Corporeal**

*Age:* child development, life phases and peer dynamics

*Race:* historical and social constructions linked to phenotypical differences

*Sex and Sexuality:* the bodily realities of masculinity, femininity and varied sexualities

*Physical and Mental Abilities:* spectrums of bodily and cognitive capability

### **Symbolic**

*Language:* first and second language learners, dialect and social language

*Ethnos:* national, ethnic, indigenous and diasporic identities

*Communities of Commitment:* religion, political orientation

*Genre:* identities based on gender and sexual orientation (the term “genre” capturing these hybrid realities)

In modern schools, for both pragmatic and ideological reasons, these differences are ignored, or erased, or removed. The pragmatic reasons are intrinsic to the one-to-many character of educational media. An assumption of sameness is written into the simultaneous listening during a lecture, the necessity of all the students being on the same page in the textbook, the uniform learning expectations written into the syllabus, and the standardizing measures of tests which determine whether students have remembered these same things. There are ideological reasons, too, to enforce uniformity related to the homogenizing project of the nation-state, the imperial insistence of states that students learn the official language and a canonical knowledge deemed good for them and necessary for society (cp. Kalantzis & Cope, 2012, chapter 3).

If the media of modern schools created cultures of sameness, the larger context was one where institutional practices enforced sameness. Modern societies have created two paradigmatic mechanisms to enforce sameness—“exclusion” and “assimilation”. Exclusion is forced in class-defined local school districts, in strict age segregation, in separate schools for learners with disabilities, and in ethnic- or race-segregated schools and border-enforcing policies that restrict human movement. Assimilation allows border crossing from outsider to acceptable insider status, conditional upon becoming like a dominant group—learning the national language, or passing entry exams that demonstrate what has deemed to be “excellence,” for instance.

## 5. Recognizing Differences

Starting in the last decades of the twentieth century, the homogenizing trajectory of modernity is reversed. Rights claims are insistently and effectively made along the lines of the demographic classifications. The powerful imperialisms of the nineteenth century, then the authoritarian nation states of the twentieth century give way by the twenty-first century to neoliberal small states, failed states, and ethnically uncommitted globalisms. Into the vacuum step a wide range of assertions of difference. Meanwhile, the homogenizing cultural logic of mass media is replaced by the differentiating logics of new media. Cultures of difference and politics of identity flourish (cp. Fraser & Honneth, 2003).

Now, we come to discover that even the rallying categories of civil rights are more complicated than the classifications would at first have us believe. Where once there was the primary opposition of women to the power of men in first wave feminism, there are now endless shades of gender and sexuality (an amalgam we call “genre”). Where once there was a struggle to accommodate disabilities, there is now a subtle spectrum of abilities, variable in time and relative to context rather than intrinsic to bodies. Where once there was a defined number of “races” for the purposes of census classification, and countries of birth to define ethnos, there is now recognized hybridity, interraciality, and diasporic complexity. The differences become impossible to list and dangerous to name too categorically. There is intersectionality, where every person might be ascribed many classifiers, and the inter-relation of different dimensions of identity and aspects of experience mean that nobody is neatly reducible to any of their constituent demographic classifiers. And there is constant change, where the differences of today are not simply traceable to anything original or “authentic”. In fact, this is when neat classifications of difference begin to fail us. These are the reasons why today, moving beyond programs designed to rectify historical injustices of gender, or race, or class, we need a learning architecture that nurtures an open productive diversity, and a pedagogy of inclusion.

## 6. Towards a Learning Architecture of Productive Diversity

Defying the seemingly neat demographic classifiers, in classrooms of today we encounter learners whose affinities are complex, belonging to fluid and overlapping affinity groups, whose encounters may be in-person or in online hangouts. We negotiate the chosen or circumstantial associations that come with strangely juxtaposed circles of friends and social media followings. We encounter personae that are increasingly self-created and with intense affect—from fashions, to gendred demeanors, to sculpted bodies, to web or game avatars. We find learners whose identities can only be accounted for in the unique conjunctions that are the narratives of visceral experience and life history.



So what is to be done? Our response is “productive diversity,” to make the differences work for us, in our civic, working and community lives—and in our schools. We are going to conclude this paper with four principles that underlie a reflexive/inclusive pedagogy, but first, we want to move from these large generalizations about the parallel trajectories of media and education in modernity, to grounded practice.

We have over the past several years been building an online learning platform, *Scholar*.<sup>1</sup> Following are several examples illustrating the ways in which we have attempted to reframe the discursive and epistemic relationships of learning, and how these transformations open possibilities to use learner diversity as a productive resource.

*Example 1: Reframing Classroom Discourse.*

Courtney Cazden identifies the following archetypal pattern in classroom discourse: Teacher initiates with a question to the class; students shoot up their hands and the teacher selects a student who responds; teacher evaluates the answer (“that’s right” or “can somebody else try?”) (cp. Cazden, 2001). The acronym to encapsulate this discursive pattern is I-R-E, or Initiate-Respond-Evaluate. Subtly, deeply, this is a discourse of sameness, of epistemic singularity. A number of students put up their hands, attempting to satisfy the teacher’s questioning by giving what they might anticipate to be the teacher’s correct answer. It’s likely there can only be one answer, because the communicative economy means that the answering student should ideally give a proxy answer for all others in the class. There’s no time for every student’s answer and no point if this would only repeat the correct answer. The answerer speaks for the others, then all wait to see whether the teacher judges the answer is right or wrong.

Now, here is *Scholar* (Figure 1) (or for that matter, a discussion board, or a blog, or a social media feed—*Scholar* is a hybrid of these new media forms, nuanced specifically for learning). The teacher, or another student, posts an update. Every student must respond. Hesitant students may wait a short time to see other comments coming through before they make theirs, and these may clarify their thinking and reduce their hesitancy. (Hesitant students would never have had the chance to enter conventional I-R-E discourse, where we would like to advance the hypothesis that the person chosen to answer a question will mostly be the least suitable.) As students respond, the diversity of responses is evident. Discussion starts between students where the point is not the right answer, but the debatability of the answer. The

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1 US Department of Education, Institute of Education Sciences: ‘The Assess-as-You-Go Writing Assistant: a student work environment that brings together formative and summative assessment’ (R305A090394); ‘Assessing Complex Performance: A Postdoctoral Training Program Researching Students’ Writing and Assessment in Digital Workspaces’ (R305B110008); ‘u-Learn.net: An Anywhere/Anytime Formative Assessment and Learning Feedback Environment’ (ED-IES-10-C-0018); ‘The Learning Element: A Lesson Planning and Curriculum Documentation Tool for Teachers’ (ED-IES-IO-C-0021); and ‘InfoWriter: A Student Feedback and Formative Assessment Environment for Writing Information and Explanatory Texts’ (ED-IES-13-C-0039). Bill and Melinda Gates Foundation: ‘Scholar Literacy Courseware’. *Scholar* is located at <http://CGScholar.com>



richness of learning is the richness of the dialogue around nuances of perspective and interpretation. This is classroom discussion still, but the logic is one of productive diversity. In this respect, it is paradigmatically the opposite of classical classroom discourse. It is reflexive: every student is in dialogue. It is inclusive: the differences can be heard, and the richness of the dialogue is in the differences.

The screenshot shows a Scholix community page. At the top, there's a navigation bar with 'Scholar' and icons for Community, Creator, Publisher, Analytics, and Bookstore. The user is logged in as William Cope. The main content area is titled 'Mr Tate's Grade 8 Writing's Updates' and features a post titled 'Ordinary People Who Lead Extraordinary Lives'. The post includes a quote: 'Writing is its own reward (Henry Miller)'. Below the quote is a list of community admins (William Cope, Rita van Haren, Richard Tate, Duncan Ferguson, Patriann Smith, Wei Liu) and members (Adam Rusch, Yingbo Chan, Soraya Garcia-Sanchez, Antony Schultz, Felisha Richards, Shelby Kozak, Hester Rodriguez). The post itself has a video thumbnail showing Rosa Parks on a bus. Below the video, there are three comments: one by Hester Rodriguez about Rosa Parks, one by Antony Schultz about Dale Beatty, and one by Yingbo Chan about Nelson Mandela. On the right side, there's a 'Recent Activity' section showing various updates and shares.

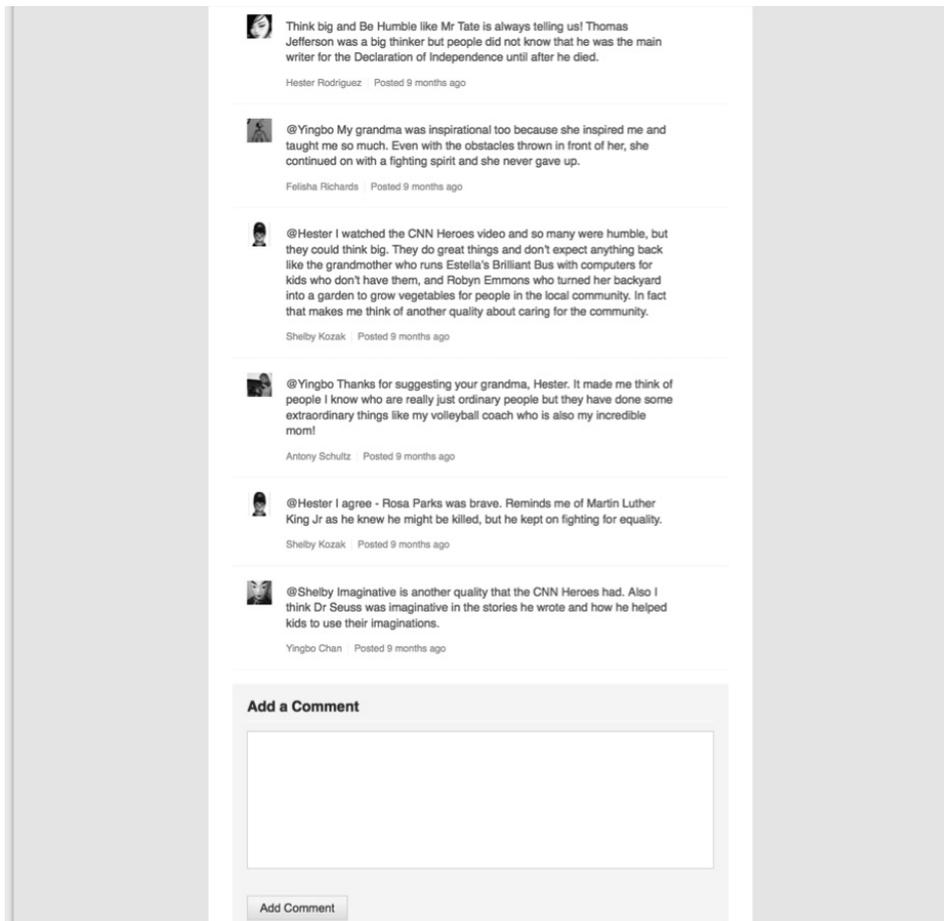


Fig. 1: Productive diversity in Scholar's "Community" space.

*Example 2: Collaborative Intelligence in Knowledge Producing Communities*

Here's a scenario from didactic/mimetic pedagogy: listen to the teacher's lecture about a great person, read the textbook about the great person, write an essay about that person, then get a grade from the teacher perhaps also with a short, judgmental comment.

Now to a *Scholar* scenario, an expanded version of which we have outlined elsewhere (cp. Kalantzis, Cope, Chan & Dalley-Trim, 2016, chapter 10). Students choose a person they consider great, because the exercise is to write a biography, rather than accept the teacher's or the textbook writer's judgment about who is great (Figure 2). By giving students a capacity to choose within a general (and higher level) expectation about biographical writing, students are positioned more strongly as knowledge producers. With this expanded scope for agency, comes expanded open-ness to the expression of identity and diversity—each student choses a subject and that choice expresses a certain kind of affinity, someone who inspires them. Students see the assessment rubric as they write, outlining the components of powerful information-

al texts in general, and biography in particular. They research multiple web sources, critically evaluating these sources. They submit drafts, then peer-review against these same criteria others' biographies. These biographies are likely of people outside their own field of vision or cultural orbit. In close reading for review, they may learn a great deal about different empirical people. As outsiders they might also be able to ask the author to elaborate on things not obvious to the writer. They might reflect on aspects of biography that they could have neglected in their own work. The might review, say, 2 or 3 other texts, then get back reviews on their own texts from 2 or 3 other people. Here we have a complex dialogical process in which the insights arise as powerfully from different subject matter and perspectives as from the common, high level criteria around the textual forms of biography. This process is reflexive: to draft against a rubric, to review others' different texts against the same rubric, to reflect on feedback from others, and perhaps also to do a self-review accounting for the impact of feedback on their text prior to publication to a shared web portfolio. The process is also inclusive, where the richness of the review and feedback experience is in the differences in subject matter and the differences in reviewer perspectives.

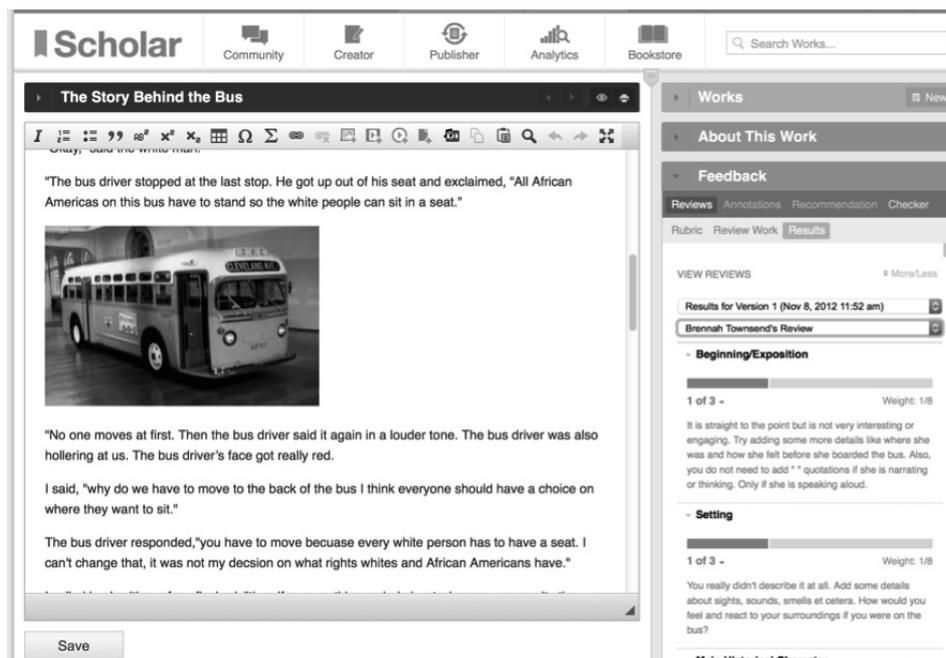


Fig. 2: Writing biography in Scholar's "Creator" space.

*Example 3: e-Learning Frameworks after the Textbook*

The classical form of the textbook was established by Petrus Ramus in the sixteenth century (cp. Ong, 1958). E-textbooks do not disrupt the textbook's fundamental discursive forms and textual premises. They bring the learnable outside world into the learner's presence by summarizing the salient aspects of the world, presenting these in an apparently objective-synoptic tenor, speaking in a singular authorial voice and laying out facts and theorems in a lock-step digest from the simpler to the more complex.

In *Scholar*, we have been developing an experimental pedagogical genre that we call a "learning module." Somewhere between a syllabus, a lesson plan and a textbook—a learning module is all and none of these—any teacher can write a learning module to share on the web. Here are the differences: we have a two column format which, on the left speaks to the student, on the right speaks in the professional language education to learning objectives, standards, and pedagogical processes (Figure 3). Instead of summarizing the world and speaking in a singular authorial voice, learning designers create updates for students which curate the world—the rich panoply of web content in multiple modes (text, image, video, manipulable data etc.). The content selected represents different perspectives and voice that, in their juxtaposition, demand interpretation. When an update is posted, the teacher can edit it, reframe and re-contextualize this curated content as needed. Once the post arrives in every learner's activity stream, this is designed to generate the kinds of multivocal dialogue that we described in our first example. Then we have projects, where learners are positioned as knowledge producers, and where the power of the learning is in the multiplicity of voices and perspectives. This we described in our second example. And in another mode of learner interaction, we have surveys of knowledge or perspective. In other words, as a pedagogical genre, the learning module is reflexive, prompting every learner to become involved in intense peer-to-peer interaction. It is also inclusive, where the strength of the knowledge community is its capacity to enable learners to use their differences as a resource for learning.

#### 4. What Makes Someone Extraordinary?

**For the Student**

*Learning Intention:*

Social skills - To actively participate in Think/Pair/Shares. To contribute to online discussions.

Understanding - To create a list of qualities that define extraordinary people.

As a class watch the TED talk - *Hero: A lesson from a volunteer firefighter* (Mark Bezos).

In a Think/Pair/Share, discuss what do you think the message is? What qualities do extraordinary people possess?

Share your idea with the class. The teacher will record these on the board.

Look back at the person you are thinking about as the focus of your research; do they possess these qualities?

*Comment:* Post a comment to Community (on Scholar) detailing the message of the TED talk. Comment on 2 - 3 student comments. List the qualities. Try not to double up on ones that have been listed by other students. Do you disagree with any listed? Discuss online with the student.



Fig. 4: Mark Bezos (TED Talk)

**For the Teacher**

conceptualising by naming

*What qualities do extraordinary people possess?*

This activity will help to scaffold students' understanding about the qualities extraordinary people possess.

It is important to have student reassess who they wish to research. They need to continue to evaluate their choice in light of what they learn.

Encourage students to post their comments in the 'Comments' in Community for each activity. This continues to be a form of accountability as well as reflection. It further develops their writing skills and confidence to work in Scholar.

**Resources**

Hero: A lesson from a volunteer firefighter Mark Bezos

**Teaching tips**

Think-Pair-Share

Attempt to tackle a new question or problem by silent thinking, comparison with another learner's attempt to answer the same question, and share this dialogue with other learners.

- *Think:* Take a few minutes to think in silence about a new idea or a difficult question. Make mental or written notes.
- *Pair:* Talk about your thoughts with a neighbor or partner. Compare notes: What are the most original, most convincing or most accurate ideas?
- *Share:* Present the best ideas of the pair to the group or class.

Adaptations of this strategy include Think-Write-Pair Share and Timed-Pair-Share.

Post Left-Side Content to a Community

Fig. 3: The "Learning Module" in Scholar

#### Example 4: Big Data Comes to School

As a counterpoint for our *Scholar* example, here is assessment in its canonical didactic/mimetic form: students learn the content presented in teacher lectures and textbooks, and then at the end of a unit of work or a course, they do a test. This test judges learners retrospectively and is standardized to measure performance against a uniform measure of expected learning outcomes. Statistical norming requires that in order for a few to excel, many be judged mediocre or failures in relation to the singular standard.

In *Scholar*, we shift the focus of assessment from the retrospective and judgmental (summative assessment) to prospective and constructive. Our measure of learning outcome is not similarity but comparability. Two biographies written by students may be very different, but on the high level criteria of an assessment rubric, we can ask the question, is their power comparable? Along the way, there are very many data points (cp. Cope & Kalantzis, 2016)—contributions to classroom discussions, multiple peer, self and teacher reviews against multiple rubric criteria, coded annotations, and machine feedback using natural language processing methods. In a single biography project in a single class there may be hundreds of thousands of such datapoints, every one semantically legible and so providing constructive feedback to learners. In the end, we can mine the data to produce a visualization that shows progress (Figure 4). We can dig down into the recorded development of an individual

student’s work to interpret progress or lack thereof. These analytics can be run at any time, to assist students who may be lagging—something that may go un-noticed in summative assessments, where the assessment always comes too late to contribute in a concrete way to the learning process. In this collaborative and open assessment environment, the visibility of peers’ works not only nurtures a productive diversity but also trends towards a high level of comparability—seeing peers’ drafts at the point of feedback and getting feedback from peers means that final drafts are more comparable to each other in terms of high level learning objectives than initial drafts. Here, we come closer to long-held aspirations to “mastery learning” (cp. Airasian, Bloom & Carroll, 1971), as opposed to the insistence upon inequality that underlies normalized distribution curves; and towards diversity contrasted with the sameness of learning required by standardized assessments. Such an environment is reflexive, offering rapid cycles of peer and machine feedback and formative assessment. It allows the teacher to calibrate their instruction for different learners, whose progress can be tracked in visualizations. And this environment is inclusive, offering teachers and students tools with which to co-ordinate the complexities of different projects, different learners’ pace of learning, and collaborative work harnessing the productive diversity of multiple peer-to-peer perspectives.

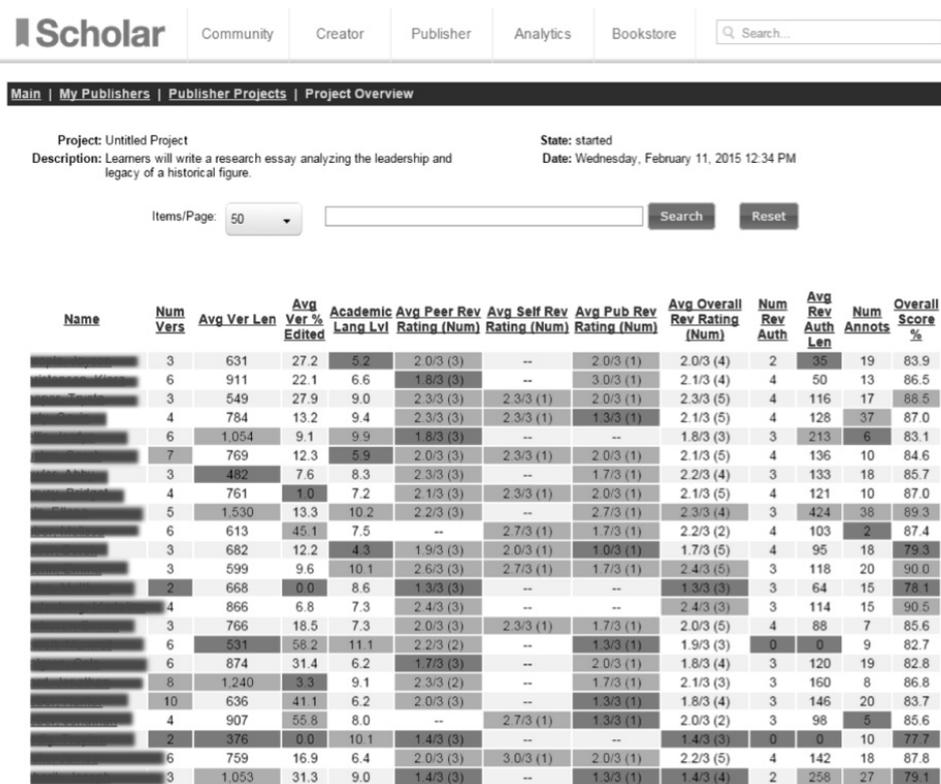


Fig 4: Scholar “Analytics” dashboard

## 7. Principles of a Reflexive/Inclusive Pedagogy

In the era of didactic/mimetic pedagogy, one-to-many pedagogy made a kind of logistical sense as a means to bring into the classroom the learnable outside world. This aligned with the wider logics of mass media and homogenizing societies.

The principles of reflexive/inclusive pedagogy realize some long-held aspirations for education, based on longstanding critiques of didactic/mimetic pedagogy, from Rousseau to Dewey, Montessori, and Tagore. If our aspirations are not new, then our contemporary educational media are. Today, networked digital technologies underpin the many-to-many media of the internet. In schools, many-to-many media have the potential to transform our pedagogies. New educational media have simply made it easier to manage the logistics of reflexive and inclusive pedagogy. Productive diversity in learning becomes more practicable. In fact, in this new social and educational milieu, an inclusive pedagogy that honors learner differences and positions them as resources for learning, become easier and more effective than one-size-fits-all teaching.

Here, to conclude, are four over-arching principles in a pedagogy of productive diversity:

### 1: *The Design Principle*

In reflexive/inclusive pedagogy, learners are designers of their own knowledge. Students are guided by their teachers and digital learning environments to encounters with available knowledge resources in the world, in all their multivocal and multimodal diversity. They remake that world according to the disciplinary scaffolds that are the studies of science, or art, or language. They are positioned as disciplinary practitioners—as scientists, as art critics or artists, as critical readers or writers. Now knowledge producers more than knowledge consumers, every artifact of their knowledge (re)making is uniquely voiced. Learning is no longer a matter of replicating received knowledge from memory. The evidence of learner activity is to be found in designed knowledge artifacts—for instance, students' projects, worked examples, online discussions, models, or the navigation paths they have taken through games, simulations or intelligent tutors. As active designers, the world of knowledge is redesigned by learners, revoiced according to the tenor of each learner's interest, identity, and experience.

### 2: *The Collaborative Principle*

Differences become productive in dynamically horizontal knowledge cultures. Different perspectives prompt deeper discussion. Offering latitude to choose topics gives space for the pursuit of interests. Providing structured peer feedback exposes learners to different perspectives and ways of thinking. Sharing work-in-progress and finished work highlights different points of focus and different angles on knowledge. In these ways, learner diversity is harnessed as a resource for learning, rather than

something that is effectively ignored or framed as a deficit as is frequently the case in one-to-many pedagogies and educational media.

### 3: *The Differentiation Principle*

No longer is it necessary, or even more convenient, to have every learner on the same page at the same time, or listening to the same lecture at the same time. It is not necessary that they do the same tasks at the same time and in the same way. It is not necessary that they work through and complete a task at the same pace. With today's dashboards, on-the-fly learning analytics, alternative navigation paths and adaptive learning mechanisms, new educational media make the organizational intricacies of productive diversity ever more manageable.

### 4: *The Comparability Principle*

Some historical forms of diversity perpetuated inequities, where for instance students judged high performing were tracked into high prestige “academic” streams, while others were tracked in to “basic” or “technical streams”. Under the principle of comparability, where assessment rubrics are pitched at a high level of generality, students can be doing different things but of comparable cognitive or practical difficulty. Learners and citizens no longer have to be the same to be equal.

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